coffey geotechnics
SPECIALISTS MANAGING THE EARTH

PRELIMINARY CONTAMINATION ASSESSMENT

MANILDRA GROUP PTY LTD
PROPOSED FLOUR MILL AND UPGRADE WORKS - SHOALHAVEN STARCHES PLANT, BOLONG ROAD, BOMADERRY, NSW

GEOTUNAN02584AA-AD
20 April 2007

Coffey Geotechnics Pty Ltd ABN 93 056 929 483
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SPECIALISTS MANAGING THE EARTH

20 April 2007

MANILDRA GROUP PTY LTD
PO Box 123
NOWRA NSW 2541

Attention: Mr Greg Murphy

Dear Sir

RE: PRELIMINARY CONTAMINATION ASSESSMENT

PROPOSED FLOUR MILL AND UPGRADE WORKS - SHOALHAVEN STARCHES PLANT, BOLONG ROAD, BOMADERRY, NSW

We are pleased to present our report on the Preliminary Contamination Assessment carried out at the above site.

Your attention is drawn to the enclosed sheet entitled "Important Information About Your Coffey Environmental Site Assessment", which should be read in conjunction with this report.

Should you have any questions in relation to the report, please do not hesitate to contact the undersigned. Thank you for your commission for this work and we look forward to being of assistance again in the future.

For and on behalf of Coffey Geotechnics Pty Ltd

M. Fernandez

MANUEL FERNANDEZ

Senior Environmental Engineer

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1 INTRODUCTION

Coffey Geotechnics Pty Ltd (Coffey) was commissioned by Manildra Group Pty Ltd (Manildra) to carry out a Preliminary Contamination Assessment at a portion of the Shoalhaven Starches Plant, Bolong Road, Bomaderry, NSW (Figure 1). The work was carried out generally in accordance with our proposal (Ref: GEOTUNAN02584AA-AB dated 3 April 2007). This report presents the results of the contamination assessment.

We understand that a new flour mill is proposed within a portion of the plant which will comprise a flour mill building, two silos and also associated upgrade works to the river bank which forms the southern part of the plant. The contamination assessment has been requested by the Department of Environment and Conservation (DEC) as part of the planning approval process for the development.

The objective of the assessment was to provide information on the potential for soil contamination to be present within the portion of the plant to be redeveloped and to make recommendations on the need for further investigation and or remediation, should contamination be present. As part of the study a preliminary check for acid sulphate soils was also carried out.

2 SCOPE OF WORK

The following scope of work was carried out to meet the objectives of this assessment:

- A limited site history study which included a walkover of the area where the upgrade works are to take place and holding interviews with persons familiar with the history of this part of the site;
- Field investigations comprising excavation of six test pits, from which the subsurface conditions were logged and soil samples were collected. In addition surface soil samples were also collected from the accessible parts of the levee/river bank;
- Carrying out field screening tests on selected soil samples for acid sulfate soils using hydrogen peroxide to assess the potential for acid sulfate soils to exist;
- Laboratory analysis of selected soil samples for a suite of analytes including Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Polycyclic Aromatic Hydrocarbons (PAH), Polychlorinated Biphenyls (PCB), Organochlorine Pesticides (OCP), Organophosphorous Pesticides (OPP), asbestos and heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc); and
- Preparation of this report summarising the limited history, presenting the fieldwork and laboratory results, interpretation of the analytical results and findings, comparing contaminant concentrations to guidelines for industrial land use, providing recommendations on the need for further investigation, remediation and/or management with respect to soil contamination and acid sulfate soils (as applicable).

3 SITE DESCRIPTION AND OBSERVATIONS

3.1 Site Location, Landuse and Property Description

The site lies within the premises of the Shoalhaven Starches plant, located on the southern side of Bolong Road, Bomaderry, NSW. The site locality is shown in Figure 1.

Reference to the Shoalhaven City Council Local Environmental Plan (LEP) 1985 indicates the site is zoned *4(e) Industrial (Restricted Development)*.

The Shoalhaven Starches plant is bounded by Bolong Road to the north and the Shoalhaven River to the south. The plant is surrounded by rural (dairy and grazing) landuse to the north and northeast, industrial landuse to the northwest.

The Shoalhaven Starches plant forms an approximately rectangular shaped block and operates primarily in the production of starch, glucose and ethanol.

The portion of the plant being assessed occupies approximately 60m x 45m.

3.2 Soils, Local Geology and Hydrogeology

Reference to the 1:100,000 Kiama Soil Landscape Series Sheet (9028, First Edition), produced by the Department of Conservation and Land Management NSW (1993) indicates that the site is located on Shoalhaven Soils. These soils are described as moderately deep Prairie Soils on levees, Red Earths and Yellow and Red Podzolic Soils on terraces and Alluvial Soils and Gleyed Podzolic soils on the floodplains.

Reference to the 1:250,000 Wollongong Geological Series Sheet (S1 56-9, First Edition) prepared by the NSW Department of Mines (1952) indicates the site is likely to be underlain by Quaternary Alluvium, gravel, swamp deposits and sand dunes.

Based on observations made of the site, surrounding topography, the nearby river, groundwater is expected to be located at a depth of about 3m to 4m and flow into the Shoalhaven River to the south.

3.3 Acid Sulfate Soil Occurrence

ASS is naturally occurring soil and sediment containing iron sulfides which when exposed to oxygen can generate sulfuric acid.

Reference to the Burrier/Berry 1:25,000 Acid Sulfate Soil Risk Map (1997) edition 2, prepared by the Department of Land and Water Conservation (DLWC), indicates that the site is located in an area with a low probability of ASS occurrence being described as elevated alluvial plains and levees. ASS, if present, are considered to be sporadic in occurrence greater than 3m below the ground surface. The map shows areas immediately to the south of the site within the river, as being estuarine bottom sediments with a high probability of ASS occurrence.

3.4 Site Observations and Site History

3.4.1 Summary of Site History

Information on the site history was obtained by interviewing available persons who have worked at the Shoalhaven Starches plant for up to 20 years with knowledge of the study area at the time of the fieldwork.

Anecdotal information indicates that the majority of the area of the Shoalhaven Starches Plant being assessed has historically been a vacant area used for accessing areas surrounding lands including the flour mill plant. The area was used primarily for transferring flour from cargo trains to the flour mill and the silos, and also for the moving of other miscellaneous items associated with works in these areas of the plant.

Areas within the proposed flour mill incorporate areas of the former flour mill and vacant paved areas. Anecdotal evidence indicated that within the former flour mill, relatively large steel containers containing flour were unloaded from the trains by forklift and were transferred to a steel platen within the flour mill. Beneath the platen, a hydraulic lift set in the ground would lift the container at one end and tilt the containers. Flour would exit via an opening at the tilted end into a hopper which would in turn transfer it to the seven silos located on the north side of the mill. Developments in the unloading techniques of containers into silos has subsequently seen the decommissioning of the plant for which it is now used to store large bagged amounts of flour and starch. Infrastructure associated with the former flour mill was removed and the area filled with concrete and sealed with asphalt.

Areas within the proposed locations of two silos were indicated to have always been forklift/loader and pedestrian access points around the southern, eastern and western sides of the current flour loader facility. Plant staff indicated however that the existing grain silo which lies to the immediate east of these areas was once a shed for storing carbon which is used in the filtrating process to produce glucose.

Anecdotal evidence indicated areas of the levee bank were once used for housing ships containers used by contractors and the onsite plumber for storing equipment and tools.

Staff indicated that in the 20 years of their employment, the study area has generally been an asphalt paved and prior was bare ground.

Machinery used within the study area including forklifts and loaders was serviced within the north-eastern part of plant.

Staff indicated that within the study areas chemical/fuels/oils were not stored, no underground fuel tanks were present and no chemical spills had taken place, to their recollection.

3.4.2 Summary of Site Observations

An environmental scientist made observations of the study area on the 5 and 11 April 2007. A summary of the relevant observations made is described below.

The study area incorporates areas to the east and west of the current flour unloader which is centrally located within the Shoalhaven Starches plant, bound by the plant railway line to the north and the Shoalhaven River to the south.

The study area generally consists of a former flour mill shed, paved surfaces a silo and the levee/river bank.

The asphalt paved surfaces are used for vehicle and pedestrian access. The areas are also used for transferring plant produce such as flour and starch in and around the flour unloader facility. The paved areas are confined to the south by a block wall which stands approximately 1m above ground surface forming part of the elevated levee bank.

The western part of the study area contains the former flour mill building, a steel framed iron clad shed. The former flour mill was observed at the time of fieldwork to be used for the temporary storage of flour and starch in relatively large storage bags. The ground surface of the mill comprised both asphalt and concrete surfaces. No visual evidence of the hydraulic lift as indicated by anecdotal evidence was noted. An electrical switchboard room was noted in the north-eastern corner of the shed. Also present was infrastructure such as hoppers and silos used for the transferring of flour to the larger seven silos located on the northern side of the shed. On the exterior of the shed, a concrete drainage channel was noted with some water runoff with a oily sheen. The source of the sheen was unknown.

The levee/river bank is located in the southern part of the study area and located between a concrete block retaining wall and the Shoalhaven River. The ground surface of the levee bank was approximately 3m to 4m above the water level of the river.. The bank surface was low to moderately vegetated with grass, lantana and small trees. Also present were cobbles and boulders of brick and concrete with sporadic occurrences general waste such as drink cans, plastic containers and paper. Two service lines/pipes of the Shoalhaven Starches Plant traverse the length of the levee bank in an east west direction linking areas to the northeast of the plant and the infrastructure located west of the cooling water pumps.

Seventeen 1000L containers of the chemical ‘Cationic Resin CTA-65’ used for the production of starch, were observed along the concrete block retaining wall near the river. Also present were four 205 litre steel drums labelled as ‘Manildra Group” on a pallet east of the 17x1000L containers containing an unknown substance. The containers appeared in good condition.

4 SAMPLING AND ANALYSIS PLAN

Based on the information collated from the limited site history and the site observations, nine sampling locations were selected to assess the soils in this portion of the plant. Information provided by Manildra indicated that the proposed development is not intending to greatly disturb the existing ground surface with the majority of works comprising driving piles and surface modifications. Some soil disturbance is likely along the levee and river bank, as some bank stabilisation works are proposed.

Due to relatively poor access and the relatively small portion of the plant being affected by the upgrade, nine sampling locations were selected as follows:

- Four locations to target area encompassed by the proposed new flour mill development works (in the vicinity of the former flour shed).
- Two locations to target areas where two proposed silos are to be constructed (one location per silo); and
- Three locations along the elevated levee bank/river bank.

The six locations targeting areas encompassed by the proposed flour mill and silos were excavated in accessible areas of the plant to check the deeper subsurface conditions.

Due to poor access and the presence of services, excavation of test pits within the levee/river bank was not practical. At this stage only surface samples could be collected and three locations were proposed in that area.

Selected soil samples were analysed for a broad suite of chemicals of concern based on field screening and field evidence of potential contamination (if present).

5 ASSESSMENT CRITERIA

5.1 Soil Vapour Criteria

For the purposes of this report the generalised soil vapour criteria presented in Table 1 have been used as a guide to the potential for volatile petroleum hydrocarbon contamination. These criteria have been developed by Coffey based on our experience (where monitoring for volatile organic compounds has occurred) to assist in the assessment of hydrocarbon contamination levels in soil. It is important to note that these generalised criteria are only a guide and that the PID has a different response to different chemicals.

TABLE 1: GENERALISED SOIL GAS CRITERIA

PID reading as ppm isobutylene	Generalised soil gas content description relating to petroleum hydrocarbon contamination
<20 ppm	NEGLIGIBLE
20 to 60 ppm	LOW
60 - 300 ppm	MODERATE
>300 ppm	SIGNIFICANT

5.2 Soil Investigation Levels (SILs)

In order to assess the degree of contamination in soils on the site, the results of soil analyses were compared with guidelines in the following references:

- NSW Department of Environment and Conservation (2006) Guidelines for the NSW Auditor Scheme (2nd Edit.);
- NSW EPA (1994) Guidelines for Assessing Service Station Sites; and
- NEPC (1999) National Environmental Protection (Assessment of Site Contamination) Measure (NEPM) – Schedule B (1) Guideline on Investigation levels for Soil and Groundwater.

The NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme and the NEPM summarises the National Environmental Health Forum (NEHF) investigation levels[1] for protection of human health for different landuses. These will be referred to as Health Based Investigation levels (HILs). The references also provide guidelines for provisional phytotoxicity investigation levels, (referred to as environmental investigation levels in the NEPM (EILs) for a range of contaminants in soils.

[1] In Imray and Langley (1994). Health Based Soil Investigation Levels. (In: The Health Risk Assessment and management of Contaminated Sites - Proceedings of the Third National Workshop on the Health Risk Assessment and Management of Contaminated Sites. Contaminated Sites Monograph Series No.5, 1996. South Australian Department of Health and Family Services/Commonwealth EPA.

Since the site will continue industrial practices the NEHF F investigation levels for commercial or industrial have been used as human health investigation levels for the site. For industrial sites, phytotoxicity criteria typically does not need to be considered.

The NSW DEC (2006) and NEPC (1999) presents guidelines for the aliphatic and aromatic components of the C_{15}-C_{36} fractions of TPH in soil for various landuses, which may be adopted for this site. The NSW EPA (1994) guidelines provide acceptable cleanup levels at Service Station Sites, which are to be redeveloped for a sensitive use such as residential. The NSW EPA also recommends the use of these guidelines for assessing hydrocarbon contaminants for sites with less sensitive landuses. Thus, these criteria are used to supplement the NEHF commercial/industrial investigation levels.

There are currently no national or NSW guidelines for asbestos in soil. The NSW EPA has advised that asbestos is a human health issue and not an environmental issue. On the advice of the NSW Department of Health, the NSW EPA have advised NSW Site Auditors (Site Auditors Meeting 1 March 2000) that “no asbestos in the soil at the surface is permitted”. Enhealth (2005) provides some guidance on assessing and managing asbestos in soil although does not provide a threshold concentration or investigation level for asbestos.

6 FIELD AND LABORATORY INVESTIGATIONS

The field investigations were carried out on the 5 and 11 April 2007 in the full time presence of an environmental scientist from our Wollongong Office.

Test pits and hand excavations were used to assess the subsurface conditions and collect soil samples.

Six test pits, designated CTP1 to CTP6 were excavated for the assessment. An excavator with a rock breaker was used to initially excavate through pavement materials which comprised asphalt and concrete. A 5 tonne excavator fitted with a 300mm toothed bucket was used to extend the test pits. The test pits were excavated to a maximum depth of 2.15m.

Four test pits (CTP1 to 4) were located within the former flour mill and pavement areas linking the former and current flour unloading mills. Two test pits, designated CTP5 and CTP6 were excavated within areas encompassed by the location of two proposed silos east of the current flour unloading mill.

Three sampling locations were positioned along the face of the levee/river bank. At each location two surface samples were collected, in total six samples designated SS1 to SS6, were collected using a shovel and a hand trowel to a maximum depth of 0.15m. (Please note that only three of the six surface soil samples were later selected for analysis).

The sampling locations were measured with a fibreglass tape relative to existing site features. The approximate sampling locations are shown in Figure 2. Engineering logs of the test pits are included in Appendix A.

6.1 Soil Sampling

A large excavator with rock breaking attachment was used to break through the asphalt and concrete layers of the paved areas. A smaller 5 tonne excavator was then used to excavate the test pits through the remaining fill and into the underlying natural soils from which the subsurface materials were logged and soil samples were collected. Samples were collected with a new pair of latex gloves from soil in the centre of the excavator bucket, which had not come into contact with the bucket.

Due to the restricted excavator access onto the levee bank and the location of three underground services it was decided that hand tools would be used for sampling along the levee/river bank. A surface sample from the top and bottom of the bank face were collected with hands tools at three locations along the levee bank. Initially a shovel was used to remove vegetation from the surface of the bank. A sampling trowel was then used to obtain surface samples at depths of 0.05m to 0.15m. Samples were collected using a new pair of latex gloves. Between sampling locations the shovel and sampling trowel were washed by brush scrubbing with a phosphate free detergent, rinsed with potable water and finally rinsed with distilled water.

Soil samples were generally collected at the surface, within the fill materials, where there was visual or olfactory evidence of contamination (if any) or at major changes in stratigraphy. The soil was placed into clean 250mL glass jars, which were sealed with Teflon lined caps, labelled and placed directly into ice-cooled chests.

For each of the samples collected into jars, a sample was collected in duplicate and tightly sealed in a plastic bag with an elastic band. The headspace air above each sample was measured using a Mini Rae 2000 Photoionisation Detector (PID) fitted with a 10.6eV lamp calibrated with isobutylene gas at a concentration of 100ppm. This instrument allows rapid semi quantitative analysis of volatile contaminants in soil. The results of headspace testing are presented in Appendix B.

Selected samples of natural soils were also collected for the purposes of acid sulphate soil screening. Soil samples collected for the purposes of acid sulfate soil screening and analysis were wrapped tightly in low-density polyethylene plastic film to expel air and were subsequently placed into labelled plastic bags. Each plastic bag was then placed immediately into an ice-cooled chest for transport to Coffey's Wollongong laboratory. Once at Coffey's Wollongong laboratory, the soil samples were placed into a refrigerator.

6.2 Field Quality Control Procedures

The field quality control was generally in accordance with the quality control plan and consisted of the following:

- Appropriate decontamination of equipment;
- Sampling was performed generally in accordance with the procedures outlined in Coffey's Environmental Field Manual (QP15/1 Issue 3, Rev. 1, 1997) which is based on industry accepted protocols for environmental sampling. This was carried out by trained environmental scientist Daniel Deen. Sampling staff had undergone Coffey internal training procedures in accordance with the Coffey field manual and supervised field training;
- Calibration of field instruments in accordance with manufacturers instructions;
- Collection of one wash blank sample from the hand auger to check the effectiveness of equipment decontamination, designated Wash Blank;
- Carrying into the field one laboratory prepared trip spike and trip blank sample including despatch to the laboratory for analysis of volatile contaminants to check the potential for cross contamination or loss of volatile contaminants during transport and sample preparation at the laboratory;

- Collection and analysis of one blind coded duplicate soil sample:
    - CTP4/0.7-0.8m and designated QC1 (analysed for TPH, BTEX, PAH, OCP, OPP, PCB, phenols, heavy metals, asbestos)
- Samples were transported in ice-cooled chests to MGT Environmental Consulting Pty Ltd (MGT) in Victoria who is NATA accredited for the analysis performed, under chain of custody conditions. A copy of the chain of custody is included in Appendix D.

6.3 Laboratory Analysis

Ten (10) soil samples were selected for analysis for the following:

- TPH - Total Petroleum Hydrocarbon
- BTEX – Benzene, Toluene, Ethylbenzene, Xylene
- Heavy Metals - As, Cd, Cr, Cu, Ni, Pb, Zn, Hg
- OCP – Organochlorine Pesticide
- OPP – Organophosphorous Pesticide
- PAH – Polycyclic Aromatic Hydrocarbons
- PCB – Polychlorinated Biphenyl
- Asbestos

Original laboratory sheets and analytical procedures for the chemical analysis are included in Appendix D.

7 RESULTS OF FIELD AND LABORATORY INVESTIGATIONS

7.1 Subsurface Conditions

The generalised subsurface conditions encountered within the portion of the plant being assessed from the test pits are summarised below:

ASPHALT Typically within the depth interval between 0 to 0.2m at sampling locations CTP1 to CTP6.

CONCRETE SLAB Typically within the depth interval between 0.1 to 0.55m at sampling locations CTP1 to CTP6.

FILL – BEDDING SAND SAND: fine to medium grained, yellow-brown, encountered at sampling locations CTP2, CTP3 and CTP4 typically between the concrete slab and alluvium to depth interval between 0.4 to 0.6m

FILL - DISTURBED ALLUVIUM Silty SAND/Gravelly Silty SAND/Gravelly SAND: fine to medium grained, dark brown, yellow brown, dark brown-grey, with fine to medium grained gravel, encountered at each test pit location (except CTP4) to depths between 0.5m to 0.75m. Typically encountered below the fill and on the surface where the natural sands have been disturbed and partially mixed through fill placement activities, surface disturbances such as trafficking and the recent removal of asphalt and concrete slabs for test pitting purposes.

ALLUVIUM Silty SAND: fine to medium grained, dark brown, pale brown, brown, brown-grey-orange, brown-dark brown, brown-dark brown-grey, encountered at all sample locations to depths between 0.6 to 2.15m.

The surface samples (SS1 to SS6) comprised of similar materials as that described for the 'Disturbed Alluvium' layer. No unusual odours were noted in soils during the sampling. No groundwater was encountered within the sampling locations.

Apart from the fill, the subsurface conditions encountered are consistent with the published geological information.

7.2 Soil Vapour

Results of the soil gas headspace measurements are presented in Appendix B.

Soil samples tested recorded negligible readings ranging between 0 to 0.7ppm. This is generally consistent with field observations and the laboratory-tested soil samples.

7.3 Acid Sulfate Soil Screening

Six soil samples were screened in our Wollongong Laboratory on 17 April 2007 using the field pH and peroxide test, generally as described in the Acid Sulfate Soil Management Advisory Committee (ASSMAC, 1998) Acid Sulfate Soils Manual and the QLD Department of Natural Resources, Mines and Energy (2004) Acid Sulfate Soils – Laboratory Methods Guidelines. Initially the pH of the soil was tested in a 1:5 solution of distilled water and then also tested following reaction with 30% hydrogen peroxide.

The results of the acid sulfate soil screening tests are presented in Appendix C.

A field pH below 4 can indicate that actual acid sulfate soils are present (i.e. soils in which oxidation of iron sulfides has occurred and have produced acid). Generally a pH drop below 3 following oxidation with hydrogen peroxide indicates the probable presence of unoxidised sulfides in the samples, and for the purposes of the screening test, is taken as an indication of the probable presence of potential acid sulfate soils.

The screening results indicated the following:

- 6 soil samples selected for screening recorded field pH values greater than 5, where sample CTP3/1.2-1.3m recorded the lowest field pH value of 5.04;
- 6 soil samples recorded pH values greater than 3, following oxidation with hydrogen peroxide, where sample CTP5/2.0-2.1m recorded the lowest pH value of 3.27.

7.4 Soil Contamination

7.4.1 Quality Assurance/Quality Control

Coffey assessed the data against predetermined Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs) (completeness, comparability, representativeness, precision and accuracy) for both field and laboratory procedures and results.

Data validation reports for each batch of samples were prepared by Coffey as part of the quality assurance programme and are included in Appendix E. Following review of laboratory reports, the following comments can be made:

- OPP surrogates recorded recoveries of 58% and 52% for the samples CTP3/0.4-0.5 and SS4 respectively, which are below the lower control limit of 60%. This could suggest that lower concentrations of OPP may have been recorded than what was actually present for these samples;
- A laboratory prepared trip spike sample (spiked with BTEX) was taken into the field and transported with the laboratory samples. Recoveries of 129% and 123% for benzene and toluene respectively are outside the upper control limit of 110%. This result is not considered significant as concentrations of volatile organic compounds were not recorded in the trip blank sample or other samples therefore it is not considered that cross contamination had occurred.
- A duplicate sample was not sent for inter laboratory analysis due to time restrictions.

Apart from the above, the QA/QC was considered generally appropriate and based on the above .it is considered that the data collected is suitable for this assessment.

7.4.2 Comparison of Results to Soil Investigation Levels

The laboratory test results for soil are summarised in Tables 5. No exceedences of the SILs were recorded. Concentrations of TPH, BTEX, PAH, OCP, OPP, PCB, Heavy Metals and asbestos in soil samples analysed were below or close to the laboratory detection limits.

TABLE 2 :

SUMMARY OF LABORATORY RESULTS FOR SOIL SAMPLES

Heavy Metals, TPH, BTEX, PAH, OCP, PCB and Asbestos

(All results in mg/kg)

Sample ID		CTP1	CTP2	CTP3	CTP3	CTP4	CTP5	CTP6	SS1	SS4	SS5
Material	THRESHOLD	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date of Sampling	CONCENTRATION	11-Apr-07	11-Apr-07	11-Apr-07	11-Apr-07	11-Apr-07	11-Apr-07	11-Apr-07	11-Apr-07	11-Apr-07	11-Apr-07
Depth (m)		0.50-0.55	0.70-0.75	0.40-0.45	1.2-1.3	0.7-0.8	0.55-0.70	0.55-0.70	0.05-0.15	0.05-0.15	0.05-0.15
HEAVY METALS											
Arsenic	500 [1]	4.5	6.5	< 2	5	6.5	4.6	6.1	5.9	6.1	8.5
Cadmium	100 [1]	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	600,000 [1]	6.5	< 5	< 5	< 5	< 5	< 5	10	7.3	12	26
Copper	5,000 [1]	13	34	< 5	9.6	10	49	26	32	33	49
Lead	1,500 [1]	9.1	48	< 5	8.1	8.3	6.2	8.6	29	32	25
Nickel	3,000 [1]	11	11	< 5	11	12	6.9	9.8	14	18	28
Zinc	35,000 [1]	44	140	< 5	40	43	48	47	180	200	110
Mercury	75 [1]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TOTAL PETROLEUM HYDROCARBONS											
C6 - C9 Fraction	65 [2]	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
C10 - C14 Fraction		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
C15 - C28 Fraction		< 100	< 100	< 100	< 100	< 100	120	< 100	< 100	< 100	< 100
C29 - C36 Fraction		< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Total C10-C36	1000 [2]	ND	ND	ND	ND	ND	120	ND	ND	ND	ND
BTEX											
Benzene	1 [2]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	130 [2]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	50 [2]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Xylene	25 [2]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
POLYCYCLIC AROMATIC HYDROCARBONS											
Benzo(a)pyrene	5 [1]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.5	< 0.1	< 0.1	< 0.1
Total PAHs	100 [1]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ORGANOCHLORINE PESTICIDE											
Heptachlor	50 [1]	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	250 [1]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aldrin + Dieldrin	50 [1]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
DDT + DDE + DDD	1000 [1]	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15
Other OCP		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL PCB	50 [1]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL OPP		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ASBESTOS	ND [3]	ND	ND	ND	-	ND	ND	ND	ND	ND	ND

NOTES:

Bold Concentration exceeds the respective threshold concentration

[1] Based on NSW DEC (2006), Guidelines for the NSW Site Auditor Scheme 2nd Edition. and NEPM (1999) (Commercial or Industrial - NEHF-F)

[2] Based on NSW EPA (1994), Guidelines for Assessing Service Station Sites

[3] On the advice of the NSW Department of Health, the NSW EPA have advised NSW Site Auditors (Site Auditors Meeting 1 March 2000) that “no asbestos in the soil at the surface is permitted”. The phrase ‘at the surface’ has not been defined.

ND Not Detected

- Not Analysed

See original laboratory reports for detection limits

8 CONCLUSIONS AND RECOMMENDATIONS

The results of this preliminary study did not indicate concentrations of a suite of potential chemicals of concern above the adopted soil investigation levels for an industrial land use setting within the soil profile tested. Based on these results it appears that there is a low likelihood of widespread contamination in the soil that would adversely affect the proposed redevelopment works.

Access to the levee/river bank was poor at the time of the fieldwork and only surface soil samples could be collected. Based on the history of this area and the results of the surface samples it appears that there is a low likelihood that these soils would be contaminated.

Acid sulphate soil risk maps suggest that the area being assessed is in an area with a low probability of acid sulphate soil occurrence. Field screening results also suggested that the soils within the upper 2m of were unlikely to be acid sulphate soils. It is probable that acid sulphate soils could occur at depths beyond those assessed in this study. We understand that the proposed development is unlikely to disturb soils below the existing pavements and some fill materials on the levee/river bank and is therefore unlikely to disturb acid sulphate soil.

Should the proposed depth of disturbance change or different soils be encountered, then this would need to be re-assessed.

The assessment of groundwater quality was not part of this study.

9 LIMITATIONS

The findings contained in this report are the result of discrete/specific methodologies used in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site at the time the investigations were carried out.

Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points. The depth of investigation at the site was generally limited to about 2m. Access to all areas was not possible due to the presence of building infrastructure and the steepness of the levee/river bank. This report does not address geotechnical issues at the site.

10 REFERENCES

1. NEPC (1999) National Environmental Protection (Assessment of Site Contamination) Measure
2. NSW EPA (1994) Contaminated Sites: Guidelines for Assessing Service Station Sites
3. NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines
4. NSW EPA (1997) Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites
5. NSW DEC (2006) Contaminated Sites: Guidelines for the NSW Site Auditor Scheme, 2nd Ed.

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Important information about your **Coffey** Environmental Site Assessment

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your environmental site assessment report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man and may change with time. For example, groundwater levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project and/or on the property.

Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered with redevelopment or on-going use of the site. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

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Important information about your **Coffey** Environmental Site Assessment

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other professionals who are affected by the report. Have Coffey explain the report implications to professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), field testing and laboratory evaluation of field samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Contact Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time. As a project progresses through planning and design toward construction and/or maintenance, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

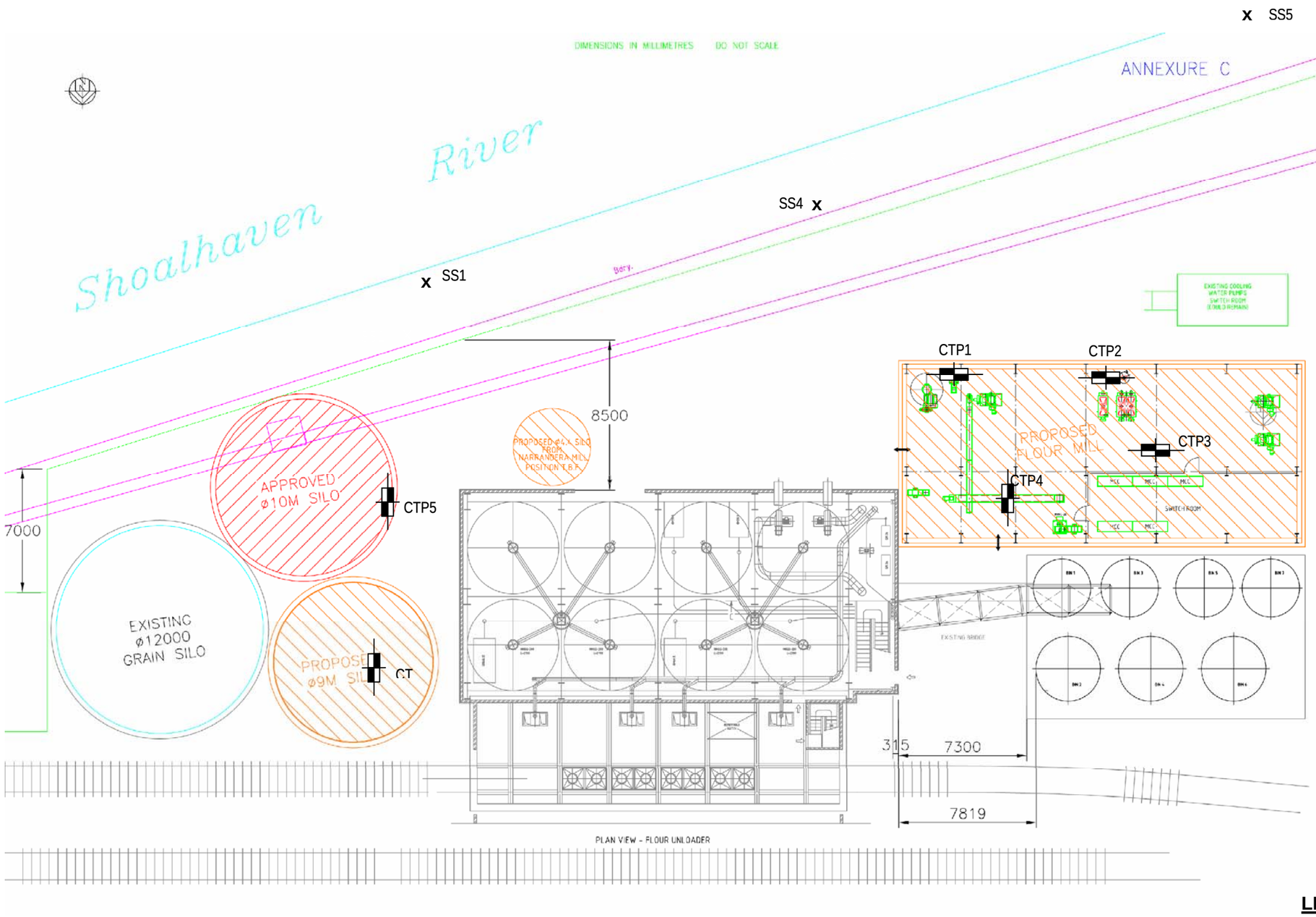
Responsibility

Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

Figures

REF: CENTRAL MAPPING AUTHORITY, 1:25,000 TOPOGRAPHIC MAP, BERRY 9028-3-N (1988)

drawn	**DD**	coffey geotechnics SPECIALISTS MANAGING THE EARTH	client:	**MANILDRA GROUP PTY LTD**
approved			project:	**PRELIMINARY CONTAMINATION ASSESSMENT PORTION OF SHOALHAVEN STARCHES PLANT, BOLONG ROAD, BOMADERRY, NSW**
date			title:	**SITE LOCALITY PLAN**
scale	**1:30,000 (approx)**		project no: **GEOTUNAN02584AA-AD**	figure no: **FIGURE 1**
original size	**A4**			



LEGEND

Approximate location of test pit

x Approximate location of surface samples

revision	description	drawn	approved	date

0 5 10 15
Scale (metres)

drawn	**DD**
approved	
date	**20/4/07**
scale	**1:250**
original size	**A3**

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SPECIALISTS MANAGING THE EARTH

client: **MANILDRA GROUP PTY LTD**

project: **PRELIMINARY CONTAMINATION ASSESSMENT PORTION OF SHOALHAVEN STARCHES PLANT, BOLONG ROAD, BOMADERRY, NSW**

title: **APPROXIMATE TEST PIT & SAMPLING LOCATIONS**

project no: **GEOTUNAN02584AA-AD** figure no: **2**

Appendix A

Engineering Logs of Test Pits

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Soil Description Explanation Sheet (1 of 2)

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil. Other materials are described using rock description terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on Sheet 2.

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 µm to 2.36 mm
	medium	200 µm to 600 µm
	fine	75 µm to 200 µm

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH s_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	Less than 15
Loose	15 - 35
Medium Dense	35 - 65
Dense	65 - 85
Very Dense	Greater than 85

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT IN:
Trace of	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: <5% Fine grained soils: <15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous across exposure or sample.	Weakly cemented	Easily broken up by hand in air or water.
Lenses	Discontinuous layers of lenticular shape.	Moderately cemented	Effort is required to break up the soil by hand in air or water.
Pockets	Irregular inclusions of different material.		

GEOLOGICAL ORIGIN

WEATHERED IN PLACE SOILS

Extremely weathered material	Structure and fabric of parent rock visible.
Residual soil	Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil	Deposited by wind.
Alluvial soil	Deposited by streams and rivers.
Colluvial soil	Deposited on slopes (transported downslope by gravity).
Fill	Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
Lacustrine soil	Deposited by lakes.
Marine soil	Deposited in ocean basins, bays, beaches and estuaries.

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Soil Description Explanation Sheet (2 of 2)

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and basing fractions on estimated mass)							USC	PRIMARY NAME
COARSE GRAINED SOILS More than 50% of materials less than 63 mm is larger than 0.075 mm	(A 0.075 mm particle is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than 2.0 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.			GW	GRAVEL
				Predominantly one size or a range of sizes with more intermediate sizes missing.			GP	GRAVEL
			GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below)			GM	SILTY GRAVEL
				Plastic fines (for identification procedures see CL below)			GC	CLAYEY GRAVEL
		SANDS More than half of coarse fraction is smaller than 2.0 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes missing			SW	SAND
				Predominantly one size or a range of sizes with some intermediate sizes missing.			SP	SAND
			SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).			SM	SILTY SAND
				Plastic fines (for identification procedures see CL below).			SC	CLAYEY SAND
FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm			IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.					
		SILTS & CLAYS Liquid limit less than 50	**DRY STRENGTH**	**DILATANCY**	**TOUGHNESS**			
			None to Low	Quick to slow	None		ML	SILT
			Medium to High	None	Medium		CL	CLAY
			Low to medium	Slow to very slow	Low		OL	ORGANIC SILT
		SILTS & CLAYS Liquid limit greater than 50	Low to medium	Slow to very slow	Low to medium		MH	SILT
			High	None	High		CH	CLAY
			Medium to High	None	Low to medium		OH	ORGANIC CLAY
HIGHLY ORGANIC SOILS			Readily identified by colour, odour, spongy feel and frequently by fibrous texture.				Pt	PEAT

• Low plasticity – Liquid Limit W_L less than 35%. • Modium plasticity – W_L between 35% and 50%.

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed. The term 'fissure' may be used for irregular joints <0.2 m in length.	
SHEARED ZONE	Zone in clayey soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks.	
SHEARED SURFACE	A near planar curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing of grains. May contain organic matter	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
INFILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Formed by infilling of open joints.	

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Rock Description Explanation Sheet (1 of 2)

The descriptive terms used by Coffey are given below. They are broadly consistent with Australian Standard AS1726-1993.

DEFINITIONS: Rock substance, defect and mass are defined as follows:

Rock Substance	In engineering terms roch substance is any naturally occurring aggregate of minerals and organic material which cannot be disintegrated or remoulded by hand in air or water. Other material is described using soil descriptive terms. Effectively homogenous material, may be isotropic or anisotropic.
Defect	Discontinuity or break in the continuity of a substance or substances.
Mass	Any body of material which is not effectively homogeneous. It can consist of two or more substances without defects, or one or more substances with one or more defects.

SUBSTANCE DESCRIPTIVE TERMS:

ROCK NAME	Simple rock names are used rather than precise geological classification.
PARTICLE SIZE	Grain size terms for sandstone are:
Coarse grained	Mainly 0.6mm to 2mm
Medium grained	Mainly 0.2mm to 0.6mm
Fine grained	Mainly 0.06mm (just visible) to 0.2mm
FABRIC	Terms for layering of penetrative fabric (eg. bedding, cleavage etc.) are:
Massive	No layering or penetrative fabric.
Indistinct	Layering or fabric just visible. Little effect on properties.
Distinct	Layering or fabric is easily visible. Rock breaks more easily parallel to layering of fabric.

CLASSIFICATION OF WEATHERING PRODUCTS

Term	Abbreviation	Definition
Residual Soil	**RS**	Soil derived from the weathering of rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported.
Extremely Weathered Material	**XW**	Material is weathered to such an extent that it has soil properties, ie, it either disintegrates or can be remoulded in water. Original rock fabric still visible.
Highly Weathered Rock	**HW**	Rock strength is changed by weathering. The whole of the rock substance is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Some minerals are decomposed to clay minerals. Porosity may be increased by leaching or may be decreased due to the deposition of minerals in pores.
Moderately Weathered Rock	**MW**	The whole of the rock substance is discoloured, usually by iron staining or bleaching , to the extent that the colour of the fresh rock is no longer recognisable.
Slightly Weathered Rock	**SW**	Rock substance affected by weathering to the extent that partial staining or partial discolouration of the rock substance (usually by limonite) has taken place. The colour and texture of the fresh rock is recognisable; strength properties are essentially those of the fresh rock substance.
Fresh Rock	**FR**	Rock substance unaffected by weathering.

Notes on Weathering:

1. AS1726 suggests the term "Distinctly Weathered" (DW) to cover the range of substance weathering conditions between XW and SW. For projects where it is not practical to delineate between HW and MW or it is judged that there is no advantage in making such a distinction. DW may be used with the definition given in AS1726.
2. Where physical and chemical changes were caused by hot gasses and liquids associated with igneous rocks, the term "altered" may be substituted for "weathering" to give the abbreviations XA, HA, MA, SA and DA.

ROCK SUBSTANCE STRENGTH TERMS

Term	Abbrev-iation	Point Load Index, I_S50 (MPa)	Field Guide
Very Low	**VL**	Less than 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with a knife; pieces up to 30mm thick can be broken by finger pressure.
Low	**L**	0.1 to 0.3	Easily scored with a knife; indentations 1mm to 3mm show with firm bows of a pick point; has a dull sound under hammer. Pieces of core 150mm long by 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	**M**	0.3 to 1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty.
High	**H**	1 to 3	A piece of core 150mm long by 50mm can not be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	**VH**	3 to 10	Hand specimen breaks after more than one blow of a pick; rock rings under hammer.
Extremely High	**EH**	More than 10	Specimen requires many blows with geological pick to break; rock rings under hammer.

Notes on Rock Substance Strength:

1. In anisotropic rocks the field guide to strength applies to the strength perpendicular to the anisotropy. High strength anisotropic rocks may break readily parallel to the planar anisotropy.
2. The term "extremely low" is not used as a rock substance strength term. While the term is used in AS1726-1993, the field guide therein makes it clear that materials in that strength range are soils in engineering terms.
3. The unconfined compressive strength for isotropic rocks (and anisotropic rocks which fall across the planar anisotropy) is typically 10 to 25 times the point load index (Is50). The ratio may vary for different rock types. Lower strength rocks often have lower ratios than higher strength rocks.

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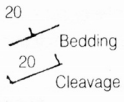
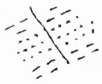
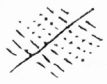
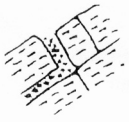
Rock Description Explanation Sheet (2 of 2)

COMMON DEFECTS IN ROCK MASSES

Term	Definition	Diagram	Map Symbol	Graphic Log (Note 1)
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub parallel to layering (eg bedding) or a planar anisotropy in the rock substance (eg, cleavage). May be open or closed.			
Joint	A surface or crack across which the rock has little or no tensile strength. but which is not parallel or sub parallel to layering or planar anisotropy in the rock substance. May be open or closed.			
Sheared Zone (Note 3)	Zone of rock substance with roughly parallel near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects. Some of the defects are usually curved and intersect to divide the mass into lenticular or wedge shaped blocks.			
Sheared Surface (Note 3)	A near planar, curved or undulating surface which is usually smooth, polished or slickensided.			
Crushed Seam (Note 3)	Seam with roughly parallel almost planar boundaries, composed of disoriented, usually angular fragments of the host rock substance which may be more weathered than the host rock. The seam has soil properties.			
Infilled Seam	Seam of soil substance usually with distinct roughly parallel boundaries formed by the migration of soil into an open cavity or joint, infilled seams less than 1mm thick may be described as veneer or coating on joint surface.			
Extremely Weathered Seam	Seam of soil substance, often with gradational boundaries. Formad by weathering of the rock substance in place.			

Notes on Defects:

1. Usually borehole logs show the true dip of defects and face sketches and sections the apparent dip.
2. Partings and joints are not usually shown on the graphic log unless considered significant.
3. Sheared zones, sheared surfaces and crushed seams are faults in geological terms.

DEFECT SHAPE TERMS

Planar	The defect does not vary in orientation
Curved	The defect has a gradual change in orientation
Undulating	The defect has a wavy surface
Stepped	The defect has one or more well defined steps
Irregular	The defect has many sharp changes of orientation

Note: The assessment of defect shape is partly influenced by the scale of the observation.

ROUGHNESS TERMS

Slickensided	Grooved or striated surface, usually polished
Polished	Shiny smooth surface
Smooth	Smooth to touch. Few or no surface irregularities
Rough	Many small surface irregularities (amplitude generally less than 1mm). Feels like fine to coarse sand paper.
Very Rough	Many large surface irregularities (amplitude generally more than 1mm). Feels like, or coarser than very coarse sand paper.

COATING TERMS

Clean	No visible coating
Stained	No visible coating but surfaces are discoloured
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Coating	A visible coating up to 1mm thick. Thicker soil material is usually described using appropriate defect terms (eg, infilled seam). Thicker rock strength material is usually described as a vein.

BLOCK SHAPE TERMS

Blocky	Approximately equidimensional
Tabular	Thickness much less than length or width
Columnar	Height much greate than cross section

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Engineering Log - Excavation

Excavation No. **CTP1**

Sheet 1 of 1

Project No: **GEOTUNAN02584-AA**

Client: **MANILDRA GROUP PTY LTD**

Date started: **11.4.2007**

Principal:

Date completed: **11.4.2007**

Project: **PRELIMINARY CONTAMINATION ASSESSMENT**

Logged by: **DD**

Test pit location: **BOLONG ROAD, BOMADERRY**

Checked by:

equipment type and model: 5T EXCAVATOR | Pit Orientation: | Easting: 56281873 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.5m long 0.3m wide | Northing: 6140123 m | datum:

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
E			NONE OBSERVED			0.0			Asphalt				PAVEMENT
									Concrete Slab				
				E		0.5			FILL: Silty Sand, fine to medium grained, dark brown, with a trace of coarse sand and fine to coarse grained gravel	D/M	MD		DISTURBED ALLUVIUM
								SM	Silty SAND: fine to medium grained, dark brown	M	MD/D		ALLUVIUM
				E		1.0							
						1.5			0.9m to 1.65m: Becoming pale brown with a trace of rootlets				
				E		2.0			1.65m to 1.95m: Becoming brown				1.8m to 1.9m: ASS Sample
									1.95m to 2.15m: Becoming brown/grey/orange mottled				
						2.5			Test pit CTP1 terminated at 2.15m				

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TESTPIT GU02584-AA LOGS.GPJ COFFEY.GDT 20.4.07

Form GEO 5.2 Issue 3 Rev.2

coffey geotechnics

Engineering Log - Excavation

Excavation No. **CTP2**

Sheet 1 of 1

Project No: **GEOTUNAN02584-AA**

Client: **MANILDRA GROUP PTY LTD**

Date started: **11.4.2007**

Principal:

Date completed: **11.4.2007**

Project: **PRELIMINARY CONTAMINATION ASSESSMENT**

Logged by: **DD**

Test pit location: **BOLONG ROAD, BOMADERRY**

Checked by:

equipment type and model: 5T EXCAVATOR | Pit Orientation: | Easting: 56281869 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.85m long 0.3m wide | Northing: 6140118 m | datum:

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
E			NONE OBSERVED			0.0			Asphalt				PAVEMENT
									Concrete Slab				
				E		0.5			FILL: Sand, fine to medium grained, yellow/brown, with some coarse sand	M/D	VL/L		FILL - BEDDING SAND
									FILL: Silty Sand, fine to medium grained, dark brown, with a trace of fine to coarse grained gravel	D	MD		DISTURBED ALLUVIUM
				E				SM	Silty SAND: fine to medium grained, dark brown		D		ALLUVIUM
				E		1.0			1.0m to 1.55m: Becoming brown				1.0m to 1.1m ASS Sample
						1.5			1.55m to 1.95m: Becoming dark brown/brown				
						2.0			Test pit CTP2 terminated at 1.95m				
						2.5							

Sketch

TESTPIT GU02584-AA LOGS.GPJ COFFEY.GDT 20.4.07

Form GEO 5.2 Issue 3 Rev.2

method
N natural exposure
X existing excavation
BH backhoe bucket
B bulldozer blade
R ripper
E excavator

support
S shoring N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
water level on date shown
water inflow
water outflow

notes, samples, tests
U_{50} undisturbed sample 50mm diameter
U_{63} undisturbed sample 63mm diameter
D disturbed sample
V vane shear (kPa)
Bs bulk sample
E environmental sample
R refusal

classification symbols and soil description
based on unified classification system

moisture
D dry
M moist
W wet
Wp plastic limit
W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Excavation

Excavation No. **CTP3**

Sheet 1 of 1

Project No: **GEOTUNAN02584-AA**

Client: **MANILDRA GROUP PTY LTD**

Date started: **11.4.2007**

Principal:

Date completed: **11.4.2007**

Project: **PRELIMINARY CONTAMINATION ASSESSMENT**

Logged by: **DD**

Test pit location: **BOLONG ROAD, BOMADERRY**

Checked by:

equipment type and model: 5T EXCAVATOR | Pit Orientation: | Easting: 56281851 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.7m long 0.3m wide | Northing: 6140090 m | datum:

excavation information						material substance						
method	penetration 1 2 3	support	water	notes samples, tests, etc	RL / depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
E					0.0			Asphalt				PAVEMENT
								Concrete Slab				
			NONE OBSERVED	E	0.5			FILL: Sand, fine to medium grained, yellow/brown, with some coarse grained sand	D	VL		FILL - BEDDING SAND
								FILL: Silty Sand, fine to medium grained, dark brown, with a trace of fine to coarse grained gravel(road base and coal wash), surounded to subangular and brick fragments		L/MD		DISTURBED ALLUVIUM
				E			SM	Silty SAND: fine to medium grained, dark brown	D/M	MD/D		ALLUVIUM
					1.0							
				E								1.2m to 1.3m: ASS Sample
					1.5							
								Test pit CTP3 terminated at 1.75m				
					2.0							
					2.5							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description
based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TESTPIT GU02584-AA LOGS.GPJ COFFEY.GDT 20.4.07

Form GEO 5.2 Issue 3 Rev.2

coffey geotechnics

Engineering Log - Excavation

Excavation No. **CTP4**

Sheet 1 of 1

Project No: **GEOTUNAN02584-AA**

Client: **MANILDRA GROUP PTY LTD**

Date started: **11.4.2007**

Principal:

Date completed: **11.4.2007**

Project: **PRELIMINARY CONTAMINATION ASSESSMENT**

Logged by: **DD**

Test pit location: **BOLONG ROAD, BOMADERRY**

Checked by:

equipment type and model: 5T EXCAVATOR | Pit Orientation: | Easting: 56281870 m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.75m long 0.3m wide | Northing: 6140120 m | datum:

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
E			NONE OBSERVED			0.0			Asphalt				PAVEMENT
									Concrete Slab				
				E		0.5			FILL: Sand, fine to coarse grained, yellow/brown, quartz	D	VL		FILL - BEDDING SAND
								SM	Silty SAND: fine to medium grained, dark brown	M	MD		ALLUVIUM
				E									No odour
						1.0					MD/D		
											D		
				E		1.5			1.3m to 1.9m: Becoming brown/dark brown/grey				
				ASS									1.7m to 1.8m: ASS Sample
						2.0			1.9m to 2.0m: Becoming dark brown/grey				
									Test pit CTP4 terminated at 2m				
						2.5							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TESTPIT GU02584-AA LOGS.GPJ COFFEY.GDT 20.4.07

Form GEO 5.2 issue 3 Rev.2

coffey geotechnics

Engineering Log - Excavation

Excavation No. **CTP5**

Sheet 1 of 1

Project No: **GEOTUNAN02584-AA**

Client: **MANILDRA GROUP PTY LTD**

Date started: **11.4.2007**

Principal:

Date completed: **11.4.2007**

Project: **PRELIMINARY CONTAMINATION ASSESSMENT**

Logged by: **DD**

Test pit location: **BOLONG ROAD, BOMADERRY**

Checked by:

equipment type and model: 5T EXCAVATOR | Pit Orientation: | Easting: m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.95m long 0.3m wide | Northing: m | datum:

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
E			NONE OBSERVED						Asphalt				PAVEMENT
						0.5			Concrete Slab				
				E					FILL: Gravelly Sand, fine to coarse grained, brown/grey, with fine to medium grained gravel subrounded to subangular	D	L		FILL - DISTURBED SEDIMENTS AND ROADBASE
				E					Silty SAND: fine to medium grained, dark brown, with a trace of fine to medium grained gravel(charcoal) and rootlets		MD/D		ALLUVIUM
						1.0							
						1.5				M	D		
						2.0			1.85m to 2.1m: Becoming pale brown/orange mottled				
				E									2.0m to 2.1m: ASS Sample
						2.5			Test pit CTP5 terminated at 2.1m				

Sketch

TESTPIT GU02584-AA LOGS.GPJ COFFEY.GDT 20.4.07

Form GEO 5.2 Issue 3 Rev.2

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

coffey geotechnics

Engineering Log - Excavation

Excavation No. **CTP6**

Sheet 1 of 1

Project No: **GEOTUNAN02584-AA**

Client: **MANILDRA GROUP PTY LTD**

Date started: **11.4.2007**

Principal:

Date completed: **11.4.2007**

Project: **PRELIMINARY CONTAMINATION ASSESSMENT**

Logged by: **DD**

Test pit location: **BOLONG ROAD, BOMADERRY**

Checked by:

equipment type and model: 5T EXCAVATOR | Pit Orientation: | Easting: m | R.L. Surface: NOT MEASURED

excavation dimensions: 1.85m long 0.3m wide | Northing: m | datum:

excavation information | **material substance**

method	penetration 1 2 3	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material: soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	pocket penetrometer kPa 100 200 300 400	structure and additional observations
E			NONE OBSERVED			0.0			Asphalt				PAVEMENT
									Concrete Slab				
						0.5			FILL: Gravelly Silty Sand, fine to medium grained, dark brown/grey, with fine to coarse grained gravel(road base/concrete), subrounded to subangular, with some coarse grained sand	D	L/MD		FILL - DISTURBED ALLUVIUM
				E				SM	Silty SAND: fine to medium grained, dark brown	D/M	D		ALLUVIUM
				E		1.0							0.75m to 0.9m: ASS Sample
										M			
						1.5							
						2.0			1.92m to 2.1m: Becoming orange/pale brown/grey mottled				
				E					Test pit CTP6 terminated at 2.1m				
						2.5							

Sketch

method
- N natural exposure
- X existing excavation
- BH backhoe bucket
- B bulldozer blade
- R ripper
- E excavator

support
- S shoring
- N nil

penetration 1 2 3 4 — no resistance ranging to refusal

water
- water level on date shown
- water inflow
- water outflow

notes, samples, tests
- U_{50} undisturbed sample 50mm diameter
- U_{63} undisturbed sample 63mm diameter
- D disturbed sample
- V vane shear (kPa)
- Bs bulk sample
- E environmental sample
- R refusal

classification symbols and soil description based on unified classification system

moisture
- D dry
- M moist
- W wet
- Wp plastic limit
- W_L liquid limit

consistency/density index

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable
VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

TESTPIT GU02584-AA LOGS.GPJ COFFEY.GDT 20.4.07

Form GEO 5.2 Issue 3 Rev.2

Appendix B

Results of Soil Vapour Testing

Coffey Geotechnics Pty Ltd
ACN 056 929 483 ABN 93 056 929 483

job no: GEOTUNAN02584-AA

sheet 1 of 2

form E5.1 - photoionisation detector results

client:	***MANILDRA GROUP PTY LTD***	Office:	***UNANDERRA***
principal:		Date:	***11/4/07***
project:	***PRELIMINARY CONTAMINATION ASSESSMENT***	By:	***DD***
location:	***BOLONG ROAD, BOMADERRY, NSW***	Checked	

PID serial number: ***MINI RAE 2000 110-008460*** lamp voltage: ***10.6eV***

last checked/calibrated: ***11/4/07*** calibration gas type/concentration: ***Isobutylene/100ppm***

location number	test type*	bore or sample probe depth (m)	duration (mins)	background reading (ppm)	last reading (ppm)	maximum reading (ppm)	notes
CTP1	HS	0.5 – 0.55	1	0.0	0.0	0.1	No Odour
CTP1	HS	0.9 – 1.05	1	0.0	0.0	0.1	No Odour
CTP1	HS	1.8 – 1.9	1	0.0	0.0	0.1	No Odour
CTP2	HS	0.5 – 0.55	1	0.0	0.1	0.2	No Odour
CTP2	HS	0.7 – 0.75	1	0.0	0.1	0.2	No Odour
CTP2	HS	1.0 – 1.1	1	0.0	0.0	0.0	No Odour
CTP3	HS	0.4 – 0.45	1	0.0	0.0	0.0	No Odour
CTP3	HS	0.65 – 0.75	1	0.0	0.0	0.0	No Odour
CTP3	HS	1.2 – 1.3	1	0.0	0.0	0.1	No Odour
CTP4	HS	0.5 – 0.55	1	0.0	0.0	0.1	No Odour
CTP4	HS	0.7 – 0.8	1	0.0	0.0	0.0	No Odour
CTP4	HS	1.4 – 1.5	1	0.0	0.0	0.0	No Odour
CTP5	HS	0.55 – 0.7	1	0.0	1.0	1.1	Slow Rise - No Odour
CTP5	HS	0.75 – 0.9	1	0.0	0.0	0.1	No Odour
CTP5	HS	2.0 – 2.1	1	0.0	0.0	0.1	No Odour
CTP6	HS	0.55 – 0.7	1	0.0	0.7	0.7	Slow Rise - No Odour
CTP6	HS	0.75 – 0.9	1	0.0	0.0	0.1	No Odour
CTP6	HS	2.0 – 2.1	1	0.0	0.0	0.1	No Odour
SS1	HS	0.05 – 0.15	1	0.0	0.0	0.0	No Odour
SS2	HS	0.05 – 0.15	1	0.0	0.0	0.0	No Odour

*Fill in the test type as follows:- BH ( ) = soil gas probe sample; (soil type - unified classification system in parentheses)
HS ( ) = headspace sample (with soil type-unified classification system in parentheses)

Coffey Geotechnics Pty Ltd
ACN 056 929 483 ABN 93 056 929 483

form E5.1 - photoionisation detector results

coffey geotechnics
SPECIALISTS MANAGING THE EARTH

job no: GEOTUNAN02584-AA

sheet 2 of 2

client:	***MANILDRA GROUP PTY LTD***	Office:	***UNANDERRA***
principal:		Date:	***11/4/07***
project:	***PRELIMINARY CONTAMINATION ASSESSMENT***	By:	***DD***
location:	***BOLONG ROAD, BOMADERRY, NSW***	Checked	

PID serial number: ***MINI RAE 2000 110-008460*** lamp voltage: ***10.6eV***

last checked/calibrated: ***11/4/07*** calibration gas type/concentration: ***Isobutylene/100ppm***

location number	test type*	bore or sample probe depth (m)	duration (mins)	background reading (ppm)	last reading (ppm)	maximum reading (ppm)	notes
SS3	HS	0.05 – 0.15	1	0.0	0.0	0.1	No Odour
SS4	HS	0.05 – 0.15	1	0.0	0.0	0.3	No Odour
SS5	HS	0.05 – 0.15	1	0.0	0.0	0.0	No Odour
SS6	HS	0.05 – 0.15	1	0.0	0.0	0.0	No Odour

*Fill in the test type as follows:- BH ( ) = soil gas probe sample; (soil type - unified classification system in parentheses)
HS ( ) = headspace sample (with soil type-unified classification system in parentheses)

Appendix C

Acid Sulfate Soil Screening Results

Coffey Geotechnics Pty Ltd
ACN 056 929 483 ABN 93 056 929 483

Acid Sulfate Soil Screening Tests

Client:	**Manildra Group**	**Job no.**	**GEOTUNAN02584AA**
Principal:		**Date:**	**17/4/07**
Project:	**Preliminary Contamination Assessment**	**Tested by:**	**DD**
Location:	**Manildra Plant, Bolong Road, Bomaderry**	**Checked by:**	

pH meter serial number:	MC-81	Date of Calibration:	17/4/07
Hydrogen Peroxide pH Prior to Use (pH units):	4.67	Hydrogen Peroxide Temperature Prior to Use (°C):	21.8
Distilled Water pH Prior to Use: (pH units):	6.46	Distilled Water Temperature Prior to Use (°C):	20.5

Sample Location	Sample Depth (m)	Soil Description	pH in 1:5 Distilled Water	pH in H_2O_2	Temp (°C)	Test Duration (min)	Observed Reaction (See Note Below)	Additional Comments
CTP1	1.8-1.9	Silty Sand, fine to medium grained, brown	6.46	4.60	23.5	27	1	
CTP2	1.0-1.1	Silty Sand, fine to medium grained, dark-brown	6.55	4.53	23.3	26	1	
CTP3	1.2-1.3	Silty Sand, fine to medium grained, dark-brown	5.04	3.75	23.0	31	2	
CTP4	1.7-1.9	Silty Sand, fine to medium grained, brown to dark-brown	7.14	5.02	23.7	33	2	
CTP5	2.0-2.1	Silty Sand, fine to medium grained, mottled dark-brown and orange	5.44	3.27	23.6	26	2	
CTP6	0.75-0.9	Silty Sand, fine to medium grained, dark-brown	6.29	3.85	24.9	41	2	

Notes:

Indicates a drop in pH to below 3 pH units, which generally indicates the presence of pyrite and the potential for acid to be produced.

1. No visible effervescence
2. Slight to moderate effervescence
3. Vigorous effervescent reaction

Appendix D

Laboratory Report

mgt Environmental Consulting Pty. Ltd.

3 Kingston Town Close, Oakleigh, Victoria 3166, Australia
Postal address: P. O. Box 276, Oakleigh, Victoria 3166, Australia
Telephone: (03) 9564 7055
Fax: (03) 9564 7190
Email: mgt@mgtenv.com.au

CERTIFICATE OF ANALYSIS

Coffey Geotechnics Pty Ltd
Unit 1/222 Berkeley St
Unanderra
NSW 2526
Site: GEOTUNAN02584AA

Report Number: 206617 Page 1 of 22
Order Number:
Date Received: Apr 13, 2007
Date Sampled: Apr 3, 2007
Date Reported: Apr 16, 2007
Contact: Manuel Fernandez

Methods

- USEPA 6010B Heavy Metals & USEPA7470/71 Mercury
- USEPA 6020 Heavy Metals
- USEPA 8082 Polychlorinated Biphenyls
- USEPA 8141A Organophosphorus Pesticides
- USEPA 8081A Organochlorine Pesticides
- USEPA 8270C Polycyclic Aromatic Hydrocarbons
- USEPA 8260B - MGT 350A Monocyclic Aromatic Hydrocarbons
- MGT100A-GC Total Recoverable Hydrocarbons
- USEPA 6010B Heavy Metals & USEPA 7470/71 Mercury
- Method 102 - ANZECC - % Moisture

Comments

Asbestos = Noel Arnold & Associates Ref No 55897-9a NATA Accreditation No. 5450

Notes

1. The results in this report supersede any previously corresponded results.
2. All Soil Results are reported on a dry basis.
3. Samples are analysed on an as received basis.

ABBREVIATIONS
mg/kg : milligrams per kilograms, mg/L : milligrams per litre, ppm : parts per million,
LOR : Limit of Reporting
RPD : Relative Percent Difference
CRM : Certified Reference Material
LCS : Laboratory Control Sample

Authorised

Michael Wright
NATA Signatory
Laboratory Manager

mgt Environmental Consulting Pty. Ltd.

3 Kingston Town Close, Oakleigh, Victoria 3166, Australia
Postal address: P. O. Box 276, Oakleigh, Victoria 3166, Australia
Telephone: (03) 9564 7055
Fax: (03) 9564 7190
Email: mgt@mgtenv.com.au

Coffey Geotechnics Pty Ltd Unit 1/222 Berkeley St Unanderra NSW 2526	Client Sample ID		CTP1/0.5-0.55	CTP2/0.7-0.75	CTP3/0.4-0.45	CTP3/1.2-1.3
	Lab Number		07-Ap03614	07-Ap03615	07-Ap03616	07-Ap03617
	Matrix		Soil	Soil	Soil	Soil
	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**				
Total Recoverable Hydrocarbons						
TRH C6-C9 Fraction by GC	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14 Fraction by GC	50	mg/kg	< 50	< 50	< 50	< 50
TRH C15-C28 Fraction by GC	100	mg/kg	< 100	< 100	< 100	< 100
TRH C29-C36 Fraction by GC	100	mg/kg	< 100	< 100	< 100	< 100
Monocyclic Aromatic Hydrocarbons						
Benzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes(ortho.meta and para)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Fluorobenzene (surr.)	1	%	78	130	110	100
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benz(a)anthracene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g.h.i)perylene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a.h)anthracene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1.2.3-cd)pyrene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Total PAH	1.6	mg/kg	< 1.6	< 1.6	< 1.6	< 1.6
Chrysene-d12 (surr.)	1	%	63	96	110	99
2-Fluorobiphenyl (surr.)	1	%	64	68	110	78

COMMENTS:

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Coffey Geotechnics Pty Ltd	Client Sample ID		CTP1/0.5-0.55	CTP2/0.7-0.75	CTP3/0.4-0.45	CTP3/1.2-1.3
Unit 1/222 Berkeley St	Lab Number		07-Ap03614	07-Ap03615	07-Ap03616	07-Ap03617
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**				
Organochlorine Pesticides						
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxophene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	130	100	100	110
Tetrachloro-m-xylene (surr.)	1	%	120	100	99	98
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Coumaphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2

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Coffey Geotechnics Pty Ltd	Client Sample ID		CTP1/0.5-0.55	CTP2/0.7-0.75	CTP3/0.4-0.45	CTP3/1.2-1.3
Unit 1/222 Berkeley St	Lab Number		07-Ap03614	07-Ap03615	07-Ap03616	07-Ap03617
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**				
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.2	< 0.2
Triphenylphosphate (surr.)	1	%	92	87	58	88
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1260	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Total PCB	1	mg/kg	< 1	< 1	< 1	< 1
Dibutylchlorendate (surr.)	1	%	130	100	100	110
Tetrachloro-m-xylene (surr.)	1	%	120	100	99	98

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Coffey Geotechnics Pty Ltd	Client Sample ID		CTP1/0.5-0.55	CTP2/0.7-0.75	CTP3/0.4-0.45	CTP3/1.2-1.3
Unit 1/222 Berkeley St	Lab Number		07-Ap03614	07-Ap03615	07-Ap03616	07-Ap03617
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**				
% Moisture	0.1	%	11	12	2.7	9.7
Asbestos			Not detected	Not detected	Not detected	
Heavy Metals (7)						
Arsenic	2	mg/kg	4.5	6.5	< 2	5.0
Cadmium	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	5	mg/kg	6.5	< 5	< 5	< 5
Copper	5	mg/kg	13	34	< 5	9.6
Lead	5	mg/kg	9.1	48	< 5	8.1
Nickel	5	mg/kg	11	11	< 5	11
Zinc	5	mg/kg	44	140	< 5	40
Heavy Metals						
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1

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Coffey Geotechnics Pty Ltd	Client Sample ID		CTP4/0.7-0.8	CTP5/0.55-0.7	CTP6/0.55-0.7	SS1
Unit 1/222 Berkeley St	Lab Number		07-Ap03620	07-Ap03621	07-Ap03622	07-Ap03623
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**				
Total Recoverable Hydrocarbons						
TRH C6-C9 Fraction by GC	20	mg/kg	< 20	< 20	< 20	< 20
TRH C10-C14 Fraction by GC	50	mg/kg	< 50	< 50	< 50	< 50
TRH C15-C28 Fraction by GC	100	mg/kg	< 100	120	< 100	< 100
TRH C29-C36 Fraction by GC	100	mg/kg	< 100	< 100	< 100	< 100
Monocyclic Aromatic Hydrocarbons						
Benzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toluene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Ethylbenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Xylenes(ortho.meta and para)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Fluorobenzene (surr.)	1	%	88	110	130	130
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Acenaphthylene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Anthracene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Benz(a)anthracene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Benzo(a)pyrene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Benzo(b)fluoranthene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Benzo(g.h.i)perylene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Benzo(k)fluoranthene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Chrysene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Dibenz(a.h)anthracene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Fluoranthene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Fluorene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Indeno(1.2.3-cd)pyrene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Phenanthrene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Pyrene	0.1	mg/kg	< 0.1	< 0.1	< 0.5	< 0.1
Total PAH	1.6	mg/kg	< 1.6	< 1.6	< 8	< 1.6
Chrysene-d12 (surr.)	1	%	100	110	120	150
2-Fluorobiphenyl (surr.)	1	%	120	110	120	110

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Coffey Geotechnics Pty Ltd	Client Sample ID		CTP4/0.7-0.8	CTP5/0.55-0.7	CTP6/0.55-0.7	SS1
Unit 1/222 Berkeley St	Lab Number		07-Ap03620	07-Ap03621	07-Ap03622	07-Ap03623
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**				
Organochlorine Pesticides						
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
a-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Aldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
b-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Chlordane	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
d-BHC	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Toxophene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibutylchlorendate (surr.)	1	%	90	71	95	90
Tetrachloro-m-xylene (surr.)	1	%	77	88	110	88
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Coumaphos	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2

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Coffey Geotechnics Pty Ltd	Client Sample ID		CTP4/0.7-0.8	CTP5/0.55-0.7	CTP6/0.55-0.7	SS1
Unit 1/222 Berkeley St	Lab Number		07-Ap03620	07-Ap03621	07-Ap03622	07-Ap03623
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**				
Diazinon	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Ethion	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Fenthion	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Merphos	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Naled	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Phorate	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Ronnel	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	< 0.5	< 0.2
Triphenylphosphate (surr.)	1	%	110	85	80	81
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1232	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1242	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1248	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1254	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Aroclor-1260	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Total PCB	1	mg/kg	< 1	< 1	< 1	< 1
Dibutylchlorendate (surr.)	1	%	90	71	95	90
Tetrachloro-m-xylene (surr.)	1	%	77	88	110	88

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Coffey Geotechnics Pty Ltd	Client Sample ID		CTP4/0.7-0.8	CTP5/0.55-0.7	CTP6/0.55-0.7	SS1
Unit 1/222 Berkeley St	Lab Number		07-Ap03620	07-Ap03621	07-Ap03622	07-Ap03623
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**				
% Moisture	0.1	%	11	8.1	8.2	6.1
Asbestos			Not detected	Not detected	Not detected	Not detected
Heavy Metals (7)						
Arsenic	2	mg/kg	6.5	4.6	6.1	5.9
Cadmium	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	5	mg/kg	< 5	< 5	10	7.3
Copper	5	mg/kg	10	49	26	32
Lead	5	mg/kg	8.3	6.2	8.6	29
Nickel	5	mg/kg	12	6.9	9.8	14
Zinc	5	mg/kg	43	48	47	180
Heavy Metals						
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1

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Coffey Geotechnics Pty Ltd	Client Sample ID		SS4	SS5	TRIP SPIKE	TRIP BLANK
Unit 1/222 Berkeley St	Lab Number		07-Ap03624	07-Ap03625	07-Ap03626	07-Ap03627
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 3, 2007	Apr 3, 2007
Analysis Type	**LOR**	**Units**				
Total Recoverable Hydrocarbons						
TRH C6-C9 Fraction by GC	20	mg/kg	< 20	< 20	-	< 20
TRH C10-C14 Fraction by GC	50	mg/kg	< 50	< 50	-	-
TRH C15-C28 Fraction by GC	100	mg/kg	< 100	< 100	-	-
TRH C29-C36 Fraction by GC	100	mg/kg	< 100	< 100	-	-
Monocyclic Aromatic Hydrocarbons						
Benzene	0.05	mg/kg	< 0.05	< 0.05	129%	< 0.05
Toluene	0.05	mg/kg	< 0.05	< 0.05	123%	< 0.05
Ethylbenzene	0.05	mg/kg	< 0.05	< 0.05	77%	< 0.05
Xylenes(ortho.meta and para)	0.05	mg/kg	< 0.05	< 0.05	78%	< 0.05
Fluorobenzene (surr.)	1	%	140	120	80%	94
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	0.1	mg/kg	< 0.1	< 0.1	-	-
Acenaphthylene	0.1	mg/kg	< 0.1	< 0.1	-	-
Anthracene	0.1	mg/kg	< 0.1	< 0.1	-	-
Benz(a)anthracene	0.1	mg/kg	< 0.1	< 0.1	-	-
Benzo(a)pyrene	0.1	mg/kg	< 0.1	< 0.1	-	-
Benzo(b)fluoranthene	0.1	mg/kg	< 0.1	< 0.1	-	-
Benzo(g.h.i)perylene	0.1	mg/kg	< 0.1	< 0.1	-	-
Benzo(k)fluoranthene	0.1	mg/kg	< 0.1	< 0.1	-	-
Chrysene	0.1	mg/kg	< 0.1	< 0.1	-	-
Dibenz(a.h)anthracene	0.1	mg/kg	< 0.1	< 0.1	-	-
Fluoranthene	0.1	mg/kg	< 0.1	< 0.1	-	-
Fluorene	0.1	mg/kg	< 0.1	< 0.1	-	-
Indeno(1.2.3-cd)pyrene	0.1	mg/kg	< 0.1	< 0.1	-	-
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	-	-
Phenanthrene	0.1	mg/kg	< 0.1	< 0.1	-	-
Pyrene	0.1	mg/kg	< 0.1	< 0.1	-	-
Total PAH	1.6	mg/kg	< 1.6	< 1.6	-	-
Chrysene-d12 (surr.)	1	%	94	84	-	-
2-Fluorobiphenyl (surr.)	1	%	120	82	-	-

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Coffey Geotechnics Pty Ltd	Client Sample ID		SS4	SS5	TRIP SPIKE	TRIP BLANK
Unit 1/222 Berkeley St	Lab Number		07-Ap03624	07-Ap03625	07-Ap03626	07-Ap03627
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 3, 2007	Apr 3, 2007
Analysis Type	**LOR**	**Units**				
Organochlorine Pesticides						
4.4'-DDD	0.05	mg/kg	< 0.05	< 0.05	-	-
4.4'-DDE	0.05	mg/kg	< 0.05	< 0.05	-	-
4.4'-DDT	0.05	mg/kg	< 0.05	< 0.05	-	-
a-BHC	0.05	mg/kg	< 0.05	< 0.05	-	-
Aldrin	0.05	mg/kg	< 0.05	< 0.05	-	-
b-BHC	0.05	mg/kg	< 0.05	< 0.05	-	-
Chlordane	0.1	mg/kg	< 0.1	< 0.1	-	-
d-BHC	0.05	mg/kg	< 0.05	< 0.05	-	-
Dieldrin	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan I	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan II	0.05	mg/kg	< 0.05	< 0.05	-	-
Endosulfan sulphate	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin aldehyde	0.05	mg/kg	< 0.05	< 0.05	-	-
Endrin ketone	0.05	mg/kg	< 0.05	< 0.05	-	-
g-BHC (Lindane)	0.05	mg/kg	< 0.05	< 0.05	-	-
Heptachlor	0.05	mg/kg	< 0.05	< 0.05	-	-
Heptachlor epoxide	0.05	mg/kg	< 0.05	< 0.05	-	-
Hexachlorobenzene	0.05	mg/kg	< 0.05	< 0.05	-	-
Methoxychlor	0.05	mg/kg	< 0.05	< 0.05	-	-
Toxophene	0.1	mg/kg	< 0.1	< 0.1	-	-
Dibutylchlorendate (surr.)	1	%	110	100	-	-
Tetrachloro-m-xylene (surr.)	1	%	84	110	-	-
Organophosphorous Pesticides						
Bolstar	0.2	mg/kg	< 0.2	< 0.2	-	-
Chlorpyrifos	0.2	mg/kg	< 0.2	< 0.2	-	-
Coumaphos	0.2	mg/kg	< 0.2	< 0.2	-	-
Demeton-O	0.2	mg/kg	< 0.2	< 0.2	-	-

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Coffey Geotechnics Pty Ltd	Client Sample ID		SS4	SS5	TRIP SPIKE	TRIP BLANK
Unit 1/222 Berkeley St	Lab Number		07-Ap03624	07-Ap03625	07-Ap03626	07-Ap03627
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 3, 2007	Apr 3, 2007
Analysis Type	**LOR**	**Units**				
Diazinon	0.2	mg/kg	< 0.2	< 0.2	-	-
Dichlorvos	0.2	mg/kg	< 0.2	< 0.2	-	-
Disulfoton	0.2	mg/kg	< 0.2	< 0.2	-	-
Ethion	0.2	mg/kg	< 0.2	< 0.2	-	-
Ethoprop	0.2	mg/kg	< 0.2	< 0.2	-	-
Fenitrothion	0.2	mg/kg	< 0.2	< 0.2	-	-
Fensulfothion	0.2	mg/kg	< 0.2	< 0.2	-	-
Fenthion	0.2	mg/kg	< 0.2	< 0.2	-	-
Merphos	0.2	mg/kg	< 0.2	< 0.2	-	-
Methyl azinphos	0.2	mg/kg	< 0.2	< 0.2	-	-
Methyl parathion	0.2	mg/kg	< 0.2	< 0.2	-	-
Mevinphos	0.2	mg/kg	< 0.2	< 0.2	-	-
Naled	0.2	mg/kg	< 0.2	< 0.2	-	-
Phorate	0.2	mg/kg	< 0.2	< 0.2	-	-
Ronnel	0.2	mg/kg	< 0.2	< 0.2	-	-
Tokuthion	0.2	mg/kg	< 0.2	< 0.2	-	-
Trichloronate	0.2	mg/kg	< 0.2	< 0.2	-	-
Triphenylphosphate (surr.)	1	%	52	110	-	-
Polychlorinated Biphenyls						
Aroclor-1016	0.1	mg/kg	< 0.1	< 0.1	-	-
Aroclor-1221	0.1	mg/kg	< 0.1	< 0.1	-	-
Aroclor-1232	0.1	mg/kg	< 0.1	< 0.1	-	-
Aroclor-1242	0.1	mg/kg	< 0.1	< 0.1	-	-
Aroclor-1248	0.1	mg/kg	< 0.1	< 0.1	-	-
Aroclor-1254	0.1	mg/kg	< 0.1	< 0.1	-	-
Aroclor-1260	0.1	mg/kg	< 0.1	< 0.1	-	-
Total PCB	1	mg/kg	< 1	< 1	-	-
Dibutylchlorendate (surr.)	1	%	110	100	-	-
Tetrachloro-m-xylene (surr.)	1	%	84	110	-	-

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Coffey Geotechnics Pty Ltd	Client Sample ID		SS4	SS5	TRIP SPIKE	TRIP BLANK
Unit 1/222 Berkeley St	Lab Number		07-Ap03624	07-Ap03625	07-Ap03626	07-Ap03627
Unanderra	Matrix		Soil	Soil	Soil	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007	Apr 3, 2007	Apr 3, 2007
Analysis Type	**LOR**	**Units**				
% Moisture	0.1	%	9.2	13	-	-
Asbestos			Not detected	Not detected		
Heavy Metals (7)						
Arsenic	2	mg/kg	6.1	8.5	-	-
Cadmium	0.5	mg/kg	< 0.5	< 0.5	-	-
Chromium	5	mg/kg	12	26	-	-
Copper	5	mg/kg	33	49	-	-
Lead	5	mg/kg	32	25	-	-
Nickel	5	mg/kg	18	28	-	-
Zinc	5	mg/kg	200	110	-	-
Heavy Metals						
Mercury	0.1	mg/kg	< 0.1	< 0.1		

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Coffey Geotechnics Pty Ltd	Client Sample ID		WASH BLANK	QC1
Unit 1/222 Berkeley St	Lab Number		07-Ap03628	07-Ap03629
Unanderra	Matrix		Water	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**		
Total Recoverable Hydrocarbons				
TRH C6-C9 Fraction by GC	0.02	mg/L	< 0.02	< 20
TRH C10-C14 Fraction by GC	0.05	mg/L	< 0.05	< 50
TRH C15-C28 Fraction by GC	0.1	mg/L	< 0.1	< 100
TRH C29-C36 Fraction by GC	0.1	mg/L	< 0.1	< 100
Monocyclic Aromatic Hydrocarbons				
Benzene	0.001	mg/L	< 0.001	< 0.05
Toluene	0.001	mg/L	< 0.001	< 0.05
Ethylbenzene	0.001	mg/L	< 0.001	< 0.05
Xylenes(ortho.meta and para)	0.001	mg/L	< 0.001	< 0.05
Fluorobenzene (surr.)	1	%	80	82
Polycyclic Aromatic Hydrocarbons				
Acenaphthene	0.001	mg/L	< 0.001	< 0.1
Acenaphthylene	0.001	mg/L	< 0.001	< 0.1
Anthracene	0.001	mg/L	< 0.001	< 0.1
Benz(a)anthracene	0.001	mg/L	< 0.001	< 0.1
Benzo(a)pyrene	0.001	mg/L	< 0.001	< 0.1
Benzo(b)fluoranthene	0.001	mg/L	< 0.001	< 0.1
Benzo(g.h.i)perylene	0.001	mg/L	< 0.001	< 0.1
Benzo(k)fluoranthene	0.001	mg/L	< 0.001	< 0.1
Chrysene	0.001	mg/L	< 0.001	< 0.1
Dibenz(a.h)anthracene	0.001	mg/L	< 0.001	< 0.1
Fluoranthene	0.001	mg/L	< 0.001	< 0.1
Fluorene	0.001	mg/L	< 0.001	< 0.1
Indeno(1.2.3-cd)pyrene	0.001	mg/L	< 0.001	< 0.1
Naphthalene	0.001	mg/L	< 0.001	< 0.1
Phenanthrene	0.001	mg/L	< 0.001	< 0.1
Pyrene	0.001	mg/L	< 0.001	< 0.1
Total PAH	0.016	mg/L	< 0.016	< 1.6
Chrysene-d12 (surr.)	1	%	80	100
2-Fluorobiphenyl (surr.)	1	%	99	130

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Coffey Geotechnics Pty Ltd Unit 1/222 Berkeley St Unanderra NSW 2526	Client Sample ID		WASH BLANK	QC1
	Lab Number		07-Ap03628	07-Ap03629
	Matrix		Water	Soil
	Sample Date		Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**		
Organochlorine Pesticides				
4.4'-DDD	0.0001	mg/L	< 0.0001	< 0.05
4.4'-DDE	0.0001	mg/L	< 0.0001	< 0.05
4.4'-DDT	0.0001	mg/L	< 0.0001	< 0.05
a-BHC	0.0001	mg/L	< 0.0001	< 0.05
Aldrin	0.0001	mg/L	< 0.0001	< 0.05
b-BHC	0.0001	mg/L	< 0.0001	< 0.05
Chlordane	0.0005	mg/L	< 0.002	< 0.1
d-BHC	0.0001	mg/L	< 0.0001	< 0.05
Dieldrin	0.0001	mg/L	< 0.0001	< 0.05
Endosulfan I	0.0001	mg/L	< 0.0001	< 0.05
Endosulfan II	0.0001	mg/L	< 0.0001	< 0.05
Endosulfan sulphate	0.0001	mg/L	< 0.0001	< 0.05
Endrin	0.0001	mg/L	< 0.0001	< 0.05
Endrin aldehyde	0.0001	mg/L	< 0.0001	< 0.05
Endrin ketone	0.0001	mg/L	< 0.0001	< 0.05
g-BHC (Lindane)	0.0001	mg/L	< 0.0001	< 0.05
Heptachlor	0.0001	mg/L	< 0.0001	< 0.05
Heptachlor epoxide	0.0001	mg/L	< 0.0001	< 0.05
Hexachlorobenzene	0.0001	mg/L	< 0.0001	< 0.05
Methoxychlor	0.0001	mg/L	< 0.0001	< 0.05
Toxophene	0.0005	mg/L	< 0.002	< 0.1
Dibutylchlorendate (surr.)	1	%	89	95
Tetrachloro-m-xylene (surr.)	1	%	93	91
Organophosphorous Pesticides				
Bolstar	0.001	mg/L	< 0.002	< 0.2
Chlorpyrifos	0.001	mg/L	< 0.002	< 0.2
Coumaphos	0.001	mg/L	< 0.002	< 0.2
Demeton-O	0.001	mg/L	< 0.002	< 0.2

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Coffey Geotechnics Pty Ltd	Client Sample ID		WASH BLANK	QC1
Unit 1/222 Berkeley St	Lab Number		07-Ap03628	07-Ap03629
Unanderra	Matrix		Water	Soil
NSW 2526	Sample Date		Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**		
Diazinon	0.001	mg/L	< 0.002	< 0.2
Dichlorvos	0.001	mg/L	< 0.002	< 0.2
Disulfoton	0.001	mg/L	< 0.002	< 0.2
Ethion	0.001	mg/L	< 0.002	< 0.2
Ethoprop	0.001	mg/L	< 0.002	< 0.2
Fenitrothion	0.001	mg/L	< 0.002	< 0.2
Fensulfothion	0.001	mg/L	< 0.002	< 0.2
Fenthion	0.001	mg/L	< 0.002	< 0.2
Merphos	0.001	mg/L	< 0.002	< 0.2
Methyl azinphos	0.001	mg/L	< 0.002	< 0.2
Methyl parathion	0.001	mg/L	< 0.002	< 0.2
Mevinphos	0.001	mg/L	< 0.002	< 0.2
Naled	0.001	mg/L	< 0.002	< 0.2
Phorate	0.001	mg/L	< 0.002	< 0.2
Ronnel	0.001	mg/L	< 0.002	< 0.2
Tokuthion	0.001	mg/L	< 0.002	< 0.2
Trichloronate	0.001	mg/L	< 0.002	< 0.2
Triphenylphosphate (surr.)	1	%	68	66
Polychlorinated Biphenyls				
Aroclor-1016	0.001	mg/L	< 0.002	< 0.1
Aroclor-1221	0.001	mg/L	< 0.002	< 0.1
Aroclor-1232	0.001	mg/L	< 0.002	< 0.1
Aroclor-1242	0.001	mg/L	< 0.002	< 0.1
Aroclor-1248	0.001	mg/L	< 0.002	< 0.1
Aroclor-1254	0.001	mg/L	< 0.002	< 0.1
Aroclor-1260	0.001	mg/L	< 0.002	< 0.1
Total PCB	0.01	mg/L	< 0.02	< 1
Dibutylchlorendate (surr.)	1	%	89	95
Tetrachloro-m-xylene (surr.)	1	%	93	91

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Coffey Geotechnics Pty Ltd Unit 1/222 Berkeley St Unanderra NSW 2526	Client Sample ID		WASH BLANK	QC1
	Lab Number		07-Ap03628	07-Ap03629
	Matrix		Water	Soil
	Sample Date		Apr 11, 2007	Apr 11, 2007
Analysis Type	**LOR**	**Units**		
% Moisture	0.1	%	-	10
Asbestos			-	Not detected
Heavy Metals (7)				
Arsenic	0.001	mg/L	< 0.001	5.1
Cadmium	0.0002	mg/L	< 0.0002	< 0.5
Chromium	0.001	mg/L	< 0.001	5.7
Copper	0.001	mg/L	< 0.001	10
Lead	0.001	mg/L	< 0.001	8.4
Nickel	0.001	mg/L	< 0.001	12
Zinc	0.001	mg/L	< 0.001	42
Heavy Metals				
Mercury	0.0001	mg/L	< 0.0001	< 0.1

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Coffey Geotechnics Pty Ltd Unit 1/222 Berkeley St Unanderra NSW 2526	Client Sample ID	CTP1/0.5-0.55	CTP1/0.5-0.55	CTP1/0.5-0.55	CTP1/0.5-0.55	Method blank
	Lab Number	07-Ap03614	07-Ap03614	07-Ap03614	07-Ap03614	Batch
	QA Description		Duplicate	Duplicate % RPD	Spike % Recovery	
	Matrix	Soil	Soil	Soil	Soil	Soil
	Sample Date	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	Units			% RPD	% Recovery	mg/L
Total Recoverable Hydrocarbons						
TRH C6-C9 Fraction by GC		-	-	<1	99	< 0.02
TRH C10-C14 Fraction by GC		-	-	<1	129	< 0.05
TRH C15-C28 Fraction by GC		-	-	<1	-	< 0.1
TRH C29-C36 Fraction by GC		-	-	<1	-	< 0.1
Monocyclic Aromatic Hydrocarbons						
Benzene		< 0.05	< 0.05	<1	87	< 0.005
Toluene		< 0.05	< 0.05	<1	93	< 0.005
Ethylbenzene		< 0.05	< 0.05	<1	92	< 0.005
Xylenes(ortho.meta and para)		< 0.05	< 0.05	<1	92	< 0.005
Fluorobenzene (surr.)		78	110	-	74	88
Polycyclic Aromatic Hydrocarbons						
Acenaphthene		< 0.1	< 0.1	<1	121	< 0.001
Acenaphthylene		< 0.1	< 0.1	<1	115	< 0.001
Anthracene		< 0.1	< 0.1	<1	89	< 0.001
Benz(a)anthracene		< 0.1	< 0.1	<1	116	< 0.001
Benzo(a)pyrene		< 0.1	< 0.1	<1	117	< 0.001
Benzo(b)fluoranthene		< 0.1	< 0.1	<1	118	< 0.001
Benzo(g.h.i)perylene		< 0.1	< 0.1	<1	113	< 0.001
Benzo(k)fluoranthene		< 0.1	< 0.1	<1	109	< 0.001
Chrysene		< 0.1	< 0.1	<1	114	< 0.001
Dibenz(a.h)anthracene		< 0.1	< 0.1	<1	111	< 0.001
Fluoranthene		< 0.1	< 0.1	<1	125	< 0.001
Fluorene		< 0.1	< 0.1	<1	111	< 0.001
Indeno(1.2.3-cd)pyrene		< 0.1	< 0.1	<1	124	< 0.001
Naphthalene		< 0.1	< 0.1	<1	117	< 0.001
Phenanthrene		< 0.1	< 0.1	<1	117	< 0.001
Pyrene		< 0.1	< 0.1	<1	130	< 0.001
Total PAH		< 1.6	< 1.6	-	-	< 0.016

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Coffey Geotechnics Pty Ltd
Unit 1/222 Berkeley St
Unanderra

NSW 2526

Client Sample	CTP1/0.5-0.55	CTP1/0.5-0.55	CTP1/0.5-0.55	CTP1/0.5-0.55	Method blank
Lab Number	07-Ap03614	07-Ap03614	07-Ap03614	07-Ap03614	Batch
QA Description		Duplicate	Duplicate % RPD	Spike % Recovery	
Matrix	Soil	Soil	Soil	Soil	Soil
Sample Date	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type / Units			% RPD	% Recovery	mg/L
Polycyclic Aromatic Hydrocarbons					
Chrysene-d12 (surr.)	63	110	-	107	100
2-Fluorobiphenyl (surr.)	64	140	-	77	110
Organophosphorous Pesticides					
Bolstar	< 0.2	< 0.2	<1	-	< 0.002
Chlorpyrifos	< 0.2	< 0.2	<1	-	< 0.002
Coumaphos	< 0.2	< 0.2	<1	110	< 0.002
Demeton-O	< 0.2	< 0.2	<1	-	< 0.002
Diazinon	< 0.2	< 0.2	<1	74	< 0.002
Dichlorvos	< 0.2	< 0.2	<1	-	< 0.002
Disulfoton	< 0.2	< 0.2	<1	-	< 0.002
Ethion	< 0.2	< 0.2	<1	71	< 0.002
Ethoprop	< 0.2	< 0.2	<1	-	< 0.002
Fenitrothion	< 0.2	< 0.2	<1	78	< 0.002
Fensulfothion	< 0.2	< 0.2	<1	100	< 0.002
Fenthion	< 0.2	< 0.2	<1	-	< 0.002
Merphos	< 0.2	< 0.2	<1	-	< 0.002
Methyl azinphos	< 0.2	< 0.2	<1	-	< 0.002
Methyl parathion	< 0.2	< 0.2	<1	75	< 0.002
Mevinphos	< 0.2	< 0.2	<1	72	< 0.002
Naled	< 0.2	< 0.2	<1	-	< 0.002
Phorate	< 0.2	< 0.2	<1	-	< 0.002
Ronnel	< 0.2	< 0.2	<1	-	< 0.002
Tokuthion	< 0.2	< 0.2	<1	-	< 0.002
Trichloronate	< 0.2	< 0.2	<1	-	< 0.002
Triphenylphosphate (surr.)	92	67	-	88	72
Heavy Metals (7)					
Arsenic	4.5	5.2	14	81	-
Cadmium	< 0.5	< 0.5	<1	82	-

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Coffey Geotechnics Pty Ltd
Unit 1/222 Berkeley St
Unanderra

NSW 2526

Client Sample	CTP1/0.5-0.55	CTP1/0.5-0.55	CTP1/0.5-0.55	CTP1/0.5-0.55
Lab Number	07-Ap03614	07-Ap03614	07-Ap03614	07-Ap03614
QA Description		Duplicate	Duplicate % RPD	Spike % Recovery
Matrix	Soil	Soil	Soil	Soil
Sample Date	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type / Units			% RPD	% Recovery
Heavy Metals (7)				
Chromium	6.5	7.4	14	75
Copper	13	16	17	94
Lead	9.1	9.0	0.80	75
Nickel	11	12	2.9	76
Zinc	44	45	2.0	80
Heavy Metals				
Mercury	< 0.1	< 0.1	<1	77

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Coffey Geotechnics Pty Ltd Unit 1/222 Berkeley St Unanderra NSW 2526	Client Sample ID	QC1	QC1	QC1	QC1
	Lab Number	07-Ap03629	07-Ap03629	07-Ap03629	07-Ap03629
	QA Description		Duplicate	Duplicate % RPD	Spike % Recovery
	Matrix	Soil	Soil	Soil	Soil
	Sample Date	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	Units			% RPD	% Recovery
Organochlorine Pesticides					
4.4'-DDD		< 0.05	< 0.05	<1	120
4.4'-DDE		< 0.05	< 0.05	<1	124
4.4'-DDT		< 0.05	< 0.05	<1	125
a-BHC		< 0.05	< 0.05	<1	101
Aldrin		< 0.05	< 0.05	<1	114
b-BHC		< 0.05	< 0.05	<1	120
Chlordane		< 0.1	< 0.1	<1	129
d-BHC		< 0.05	< 0.05	<1	110
Dieldrin		< 0.05	< 0.05	<1	123
Endosulfan I		< 0.05	< 0.05	<1	120
Endosulfan II		< 0.05	< 0.05	<1	119
Endosulfan sulphate		< 0.05	< 0.05	<1	121
Endrin		< 0.05	< 0.05	<1	125
Endrin aldehyde		< 0.05	< 0.05	<1	110
Endrin ketone		< 0.05	< 0.05	<1	80
g-BHC (Lindane)		< 0.05	< 0.05	<1	103
Heptachlor		< 0.05	< 0.05	<1	118
Heptachlor epoxide		< 0.05	< 0.05	<1	119
Hexachlorobenzene		< 0.05	< 0.05	<1	102
Methoxychlor		< 0.05	< 0.05	<1	92
Toxophene		< 0.1	< 0.1	<1	95
Polychlorinated Biphenyls					
Aroclor-1016		< 0.1	< 0.1	<1	-
Aroclor-1221		< 0.1	< 0.1	<1	-
Aroclor-1232		< 0.1	< 0.1	<1	-
Aroclor-1242		< 0.1	< 0.1	<1	-
Aroclor-1248		< 0.1	< 0.1	<1	-
Aroclor-1254		< 0.1	< 0.1	<1	-

COMMENTS:

3 Kingston Town Close, Oakleigh, Victoria 3166, Australia
Postal address: P. O. Box 276, Oakleigh, Victoria 3166, Australia
Telephone: (03) 9564 7055
Fax: (03) 9564 7190
Email: mgt@mgtenv.com.au

Coffey Geotechnics Pty Ltd
Unit 1/222 Berkeley St
Unanderra

NSW 2526

Client Sample	QC1	QC1	QC1	QC1	Method blank
Lab Number	07-Ap03629	07-Ap03629	07-Ap03629	07-Ap03629	Batch
QA Description		Duplicate	Duplicate % RPD	Spike % Recovery	
Matrix	Soil	Soil	Soil	Soil	Soil
Sample Date	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007	Apr 11, 2007
Analysis Type	Units		% RPD	% Recovery	mg/L
Polychlorinated Biphenyls					
Aroclor-1260	< 0.1	< 0.1	<1	89	-
Total PCB	< 1	< 1	<1	92	-
Dibutylchlorendate (surr.)	95	140	-	99	-
Tetrachloro-m-xylene (surr.)	91	110	-	85	-
Heavy Metals (7)					
Arsenic	5.1	4.7	9.7	83	< 0.02
Cadmium	< 0.5	< 0.5	<1	81	< 0.02
Chromium	5.7	5.7	<1	76	< 0.05
Copper	10	9.8	3.6	89	< 0.05
Lead	8.4	7.8	9.1	77	< 0.05
Nickel	12	11	4.8	76	< 0.05
Zinc	42	38	10	76	< 0.05
Heavy Metals					
Mercury	< 0.1	< 0.1	<1	80	< 0.005

COMMENTS:

mgt Environmental Consulting Pty. Ltd.

3 Kingston Town Close, Oakleigh, Victoria 3166, Australia
Postal address: P. O. Box 276, Oakleigh, Victoria 3166, Australia
Telephone: (03) 9564 7055
Fax: (03) 9564 7190
Email: mgt@mgtenv.com.au

Sample Receipt Advice

Company name:	Coffey Geotechnics Pty Ltd UNAN
Contact name:	Manuel Fernandez
Client job number:	GEOTUNAN02584AA
COC number:	30785
Turn around time:	24 hour turnaround time
Date received:	Apr 13, 2007
MGT lab reference:	206617

Sample information

- ☑ All samples have been received as described on the above COC.
- ☑ COC has been completed correctly.
- ☑ All samples were provided chilled.
- ☑ Appropriately preserved sample containers have been used.
- ☑ All samples were received in good condition.
- ☑ Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.

Contact notes

If you have any questions with respect to these samples please contact:

Onur Mehmet on the above number or by e.mail: mehmeto@mgtenv.com.au

Results & invoice will be delivered electronically via e.mail to Manuel Fernandez - manuel_fernandez@coffey.com.au.

mgt Sample Receipt

No: 30784

Chain of Custody

Coffey

Laboratory Quotation / Order No. (Coffey)

Job No. (60)NAN02628AA Sheet 1 of 2

Dispatch to: (Address & Phone No.) ALS Environmental, 2 Byth Place, Canning Vale WA 6155 (08) 92647055

Sampled by: David Dee

Consigning Officer: [illegible]

Date Dispatched: 4/9/07

Attention: Sample Receipt

Project Manager (report results to): Manuel Fernandez

Courier Service: TNT

Consignment Note No. 7109 2595

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
D Dee	04/07	5 pm			

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	Analyses Required: PAHs	TPHs	BTEX / NAHs	Metals: (8)	Sample Condition on Receipt
	SOIL	Glass jar + Al	CP1/0.2-0.35	4/9/07					
			/0.9-1.05						
			/1.5-1.9						
			CP2/0.5-0.65						
			/0.7-0.85						
			/1.0-1.1						
			CP3/0.9-1.05						
			/0.65-0.85						
			/1.12-1.3						
			CP4/0.2-0.35						
			/0.7-0.85						
			/1.1-1.5						
			CP5/0.35-0.7						
			/0.7-0.8						
			/1.0-2.1						
			CP6/0.35-0.7						
			/0.75-0.9						

#20661

Robert C

13-04-07

Special Laboratory Instructions: Report SOC as PAH, OCP, PCB, OPP

Detection Limits:

Turnaround Required: 24hr

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

No: 30785

Chain of Custody

Laboratory Quotation / Order No: Coffey

Job No: [illegible] Sheet 2 of 2

Dispatch to: (Address & Phone No.)	MGT Environmental, 3 [illegible] Close, Oakleigh VIC 3166 (03) 9564 7055	Sampled by: Daniel Deer	Consigning Officer: [illegible]
			Date Dispatched: 2/4/07
Attention:	Sample Receipt	Project Manager: (report results to) Manuel Fernandez	Courier Service: TNT
			Consignment Note No. 7109783[illegible]

Relinquished by:	Date:	Time:	Received by:	Date:	Time:
D. Deer	12/4/07	[illegible]			

Comments	Sample Matrix	Container Type and Preservative	Sample No.	Date Sampled	PAHs	TPHs	MAHs = BTEX	Metals: (8)	PCB	OCP	Asbestos	TPH/BTEX	SVOC	[illegible]	Sample Condition on Receipt
	SOIL	Glass jar sealed	07P6/20-2.1	11/4/07											
	↓	↓	SS1	↓				/			/	/	/		
			SS2												
			SS3												
			SS4					/			/	/	/		
			SS5					/			/	/	/		
			SS6												
	↓	↓	[illegible]	↓											
	Soil	[illegible]	Trip Spike	3/4/07			/								
	Water	[illegible]	Trip Blank C030307	3/4/07			/								
	WATER		Wash Blank C190307	11/4/07				/			/	/	/	/	#20661 7
	SOIL	Glass jar sealed	QC1	11/4/07				/			/	/	/		Robert C
	↓	↓	QC2	↓											13-4-07
			QC3												

Special Laboratory Instructions: Report SVOC & PAH, OCP, OPP, PCB

Detection Limits:

Turnaround Required: 24 hr

JOB NUMBER MUST BE REFERENCED ON ALL SUBSEQUENT PAGES

Appendix E

Data Validation Report

Coffey Geotechnics Pty Ltd
A.B.N. 93 056 929 483

I. SAMPLE HANDLING

	Yes	No (Comment below)
1. Were the sample **holding times** met?	☒	☐
2. Were the samples in **proper custody** between the field and reaching the laboratory?	☒	☐
3. Were the samples **properly and adequately** preserved? *This includes keeping the samples chilled, where applicable.*	☒	☐
4. Were the samples received by the laboratory in good condition?	☒	☐

COMMENTS:

Sample Handling was: ☒ Satisfactory ☐ Partially Satisfactory ☐ Unsatisfactory

Coffey Geotechnics Pty Ltd
A.B.N. 93 056 929 483

II PRECISION/ACCURACY ASSESSMENT

	Yes	No (Comment below)
1. Was a NATA registered laboratory used?	☒	☐
2. Did the laboratory perform the requested tests?	☒	☐
3. Were the laboratory methods adopted NATA endorsed?	☒	☐
4. Were the appropriate test procedures followed?	☒	☐
5. Were the reporting limits satisfactory?	☒	☐
6. Was the NATA Seal on the reports?	☒	☐
7. Were the reports signed by an authorised person?	☒	☐

COMMENTS:

Precision/Accuracy of the Laboratory Report	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

Coffey Geotechnics Pty Ltd
A.B.N. 93 056 929 483

III. FIELD QA/QC

1. Number of Primary Samples Analysed — Soil: 10; Water: 0

2. Number of Days of Sampling: — Soil: 1; Water: N/A

3. Number and Type of QA/QC Samples Collected:

	SOIL	WATER
Field Duplicates	☒	NA
Trip Blanks	☒	NA
Wash Blanks	☒	NA
Other (Field Blanks, Spiked Trip Blanks, etc.)	☒	NA

4. FIELD DUPLICATES

	Yes	No (Comment below)
A. Were an Adequate Number of field duplicates collected?	☒	☐
B. Were RPDs within Control Limits?		
a. Organics (< 50 %)	☒	☐
b. Metals/Inorganics (< 50 %)	☐	☒

COMMENTS:

- An inconsistency was recorded between the duplicate pair CTP4/0.7-0.8 and QC1 for the heavy metal chromium. The primary soil sample (CTP4/0.7-0.8) recorded a concentration below the Limit of Reporting (LOR) of 5mg/kg but the duplicate recorded a concentration of 5.7mg/kg. This result is not considered significant as concentrations were close to the LOR.

Coffey Geotechnics Pty Ltd
A.B.N. 93 056 929 483

5. TRIP BLANKS

	Yes	No (Comment below)
A. Were an Adequate Number of trip blanks collected?	☒	☐
B. Were the Trip Blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☒	☐

6. WASH BLANKS

	Yes	No (Comment below)
A. Were an adequate number of Wash Blanks collected?	☒	☐
B. Were the Wash Blanks free of contaminants? (If no, comment whether the contaminants present are also detected in the samples and whether they are common laboratory chemicals.)	☒	☐

COMMENTS:

- Soil samples were primarily collected directly from the centre of the excavator bucket using a clean pair of disposable gloves for each sample and therefore a wash blank was not considered necessary for test pit samples. A wash blank was collected however for surface samples collected using hand tools (i.e. sampling trowel)
- A laboratory prepared trip spike sample (spiked with BTEX) was taken into the field and transported with the laboratory samples. The recoveries of the trip spike sample ranged between 77% and 129%. Recoveries of 129% and 123% were recorded for benzene and toluene respectively, which is outside the upper control limit of 110%. This result is not considered significant as concentrations of volatile organic compounds were not recorded in the trip blank sample or other samples therefore it is not considered that cross contamination had occurred. Ethylbenzene and Xylenes recorded recoveries within the control limits of 60% and 110%.

Field QA/QC was:	☒ Satisfactory	☐ Unsatisfactory
	☐ Partially Satisfactory	

Coffey Geotechnics Pty Ltd
A.B.N. 93 056 929 483

IV LABORATORY INTERNAL QUALITY CONTROL PROCEDURES

5. Type of QA/QC Samples

	SOIL	WATER
Laboratory Blanks/Reagent Blanks	☒	NA
Matrix Spikes/Matrix Spike Duplicates	☒	NA
Laboratory Duplicates	☒	NA
Surrogates	☒	NA

	Yes	No (Comment below)
2 Were the laboratory blanks/reagents blanks free of contamination?	☒	☐
3. Were the spike recoveries within control limits?		
a. Organics (60% to 110%)	☐	☒
b. Metals/Inorganic (70% to 130%)	☒	☐
4. Were the RPDs of the laboratory duplicates within control limits?	☒	☐
5. Were the surrogate recoveries within control limits?	☒	☐

COMMENTS:

- OCP and PCB surrogates recorded recoveries of 120% and 130% for the sample CTP1/0.5-0.55 which are outside the upper control limit of 110%. These results can be disregarded as concentrations of OCP and PCB in this sample were below the laboratory Limits of Reporting (LOR).
- PAH surrogates recorded recoveries ranging between 120% and 150% for the samples CTP4/0.7-0.8, CTP6/0.55-0.7, SS1, SS4 and QC1 which are outside the upper control limit of 110%. These results can be disregarded as concentrations of PAH in these samples were below the laboratory LOR.
- BTEX surrogates recorded recoveries ranging between 120% and 140% for the samples CTP2/0.7-0.75, CTP6/0.55-0.7, SS1, SS4 and SS5 which are outside the upper control limit of 110%. These results can be disregarded as concentrations of BTEX in these samples were below the laboratory LOR.
- OPP surrogates recorded recoveries of 58% and 52% for the samples CTP3/0.4-0.45 and SS4 respectively, which are below the lower control limit of 60%. This could suggest that lower concentrations of OPP may have been recorded than what was actually present for these samples
- In the batch QA/QC, a PCB surrogate recorded a recovery of 140% for the sample QC1 which is outside the upper control limit of 110%. This result can be disregarded as concentrations of PCB in this sample was below the LOR
- In the batch QA/QC, a PAH surrogate recorded a recovery of 140% for the sample CTP1/0.5-0.55 which is outside the upper control limit of 110%. This result can be disregarded as concentrations of PAH in this sample was below the LOR

- In the batch QA/QC, matrix spikes recorded recoveries ranging between 111% and 130% for PAH, BTEX and OCP for the samples CTP1/0.5-0.55 and QC1, which are outside the upper control limit of 110%. These results can be disregarded as PAH, BTEX and OCP concentrations in the batch were recorded below the LOR.

5. The laboratory internal QA/QC was:	☐ Satisfactory	☐ Unsatisfactory
	☒ Partially Satisfactory	

Coffey Geotechnics Pty Ltd
A.B.N. 93 056 929 483

V. DATA USABILITY

1.	Data Directly Usable	☐
2.	Data Usable with the following corrections/modifications (see comment below)	☒
3.	Data Not Usable	☐

COMMENTS:

- A laboratory prepared trip spike sample (spiked with BTEX) was taken into the field and transported with the laboratory samples. Recoveries of 129% and 123% for benzene and toluene respectively are outside the upper control limit of 110%. This result is not considered significant as concentrations of volatile organic compounds were not recorded in the trip blank sample or other samples therefore it is not considered that cross contamination had occurred.
- OPP surrogates recorded recoveries of 58% and 52% for the samples CTP3/0.4-0.45 and SS4 respectively, which are below the lower control limit of 60%. This could suggest that lower concentrations of OPP may have been recorded than what was actually present for these samples

QA/QC Report Prepared by Daniel Deen

QA/QC Report Reviewed by: _____
(Project Manager)